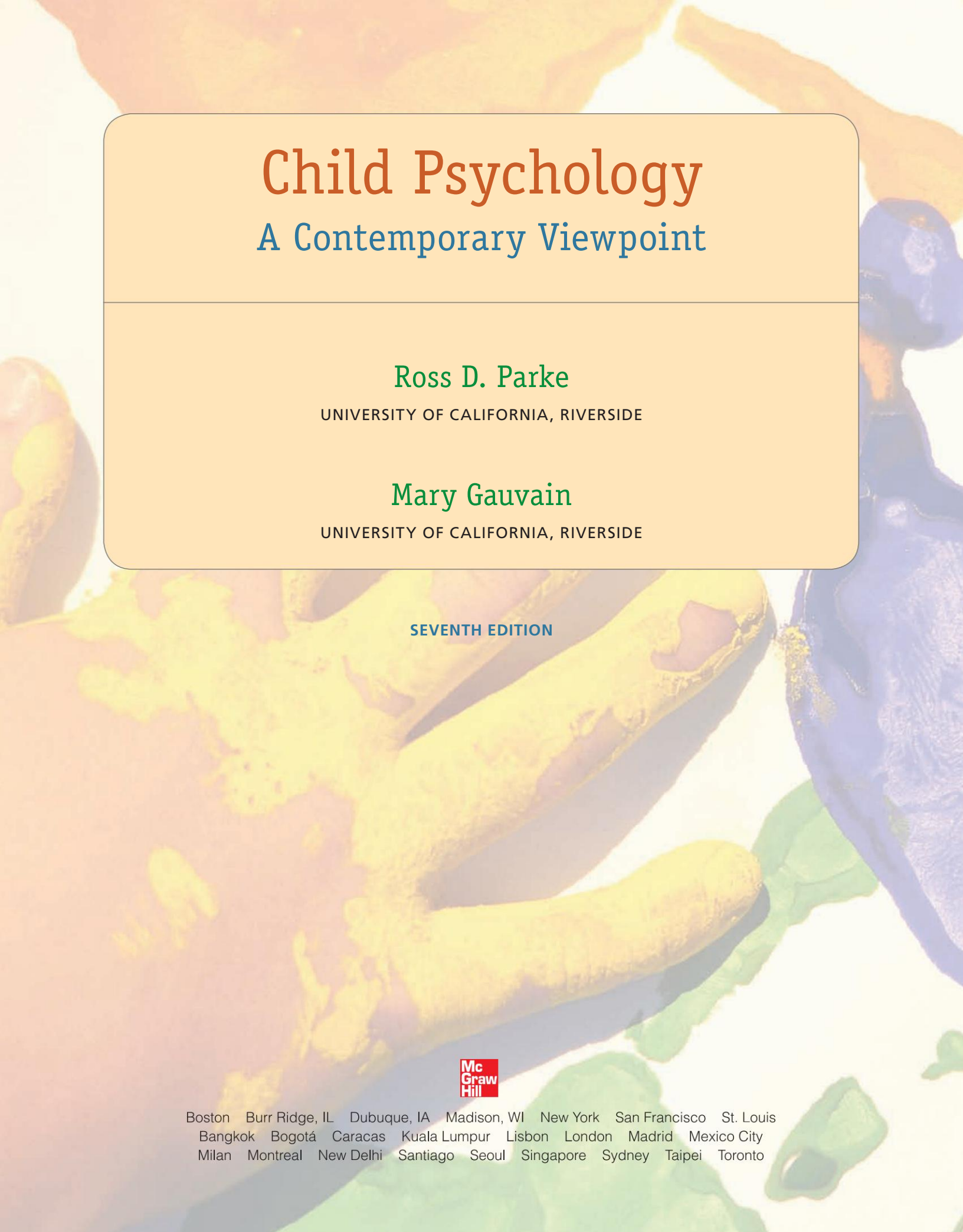# Child Psychology

A Contemporary Viewpoint

Child Psychology
A Contemporary Viewpoint

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SEVENTH EDITION

To children everywhere

About the Authors

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Ross D. Parke is Distinguished Professor of Psychology and director of the Center for Family Studies at the University of California, Riverside. He is past president of the Society for Research in Child Development and of Division 7, the Developmental Psychology Division, of the American Psychological Association, and in 1995, he received the G. Stanley Hall award from this APA division. Parke was elected a fellow of the American Association for the Advancement of Science in 1997. He has served as editor of both the *Journal of Family Psychology* and *Developmental Psychology* and as associate editor of *Child Development*. Parke is the author of *Fatherhood,* coauthor of *Throwaway Dads* (with Armin Brott), and coeditor of *Family-Peer Relationships: In Search of the Linkages* (with Gary Ladd), *Children in Time and Place* (with Glen Elder and John Modell), and *Exploring Family Relationships With Other Social Contexts* (with Sheppard Kellam). Parke's research has focused on early social relationships in infancy and childhood. He obtained his PhD from the University of Waterloo, Ontario, Canada, and is well known for his early work on the effects of punishment, aggression, and child abuse and for his work on the father's role in infancy and early childhood. Parke's current work focuses on the links between family and peer social systems, ethnic variations in families, and the effects of the new reproductive technologies on families.

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Preface

Child psychology is a field on the move, for the study of children's development continues to undergo rapid change. In recent years, theorists and researchers have taken giant steps in several areas. For example, they have offered the field new insights into the biological underpinnings of behavior. They have also revealed remarkable cognitive skills in infants, and they have explored the effects of new family arrangements on children's development.

In this seventh edition of *Child Psychology: A Contemporary Viewpoint,* we continue to reflect the dynamic nature of the field of child psychology. Much of the new research we discuss highlights the central processes that account for developmental change within the different areas of child development. Designed primarily for use in child psychology or child development courses in either 2- or 4-year colleges, our book takes a topical approach to the course material. This allows us to help the student explore in depth such subjects as how the continuing interaction between genetic and environmental factors affects children's development, how children's learning of language helps them sharpen their cognitive skills, and how children's growing emotional skills help them in their relationships with peers and friends. Throughout the book, we emphasize the interplay across the different areas of psychological growth—biological, emotional, cognitive, and social.

In this edition, we have tried to ensure that our book continues to provide both students and instructors with a current and exciting overview of child development. Although we have made many revisions in this edition, our goal remains the same: to present the most important contemporary issues in child psychology in such a way that students not only will understand the material but will find it useful in their lives and in their professional careers. We hope the academic community will find this new edition a valuable teaching tool as well as a comprehensive and current resource.

DISTINGUISHING CHARACTERISTICS OF THIS BOOK

Several characteristics continue to distinguish *Child Psychology: A Contemporary Viewpoint.* We offer balanced theoretical discussions, we explore both basic research and its practical applications, and throughout the book, we integrate multicultural and cross-cultural research.

Balanced Theoretical Perspectives

Our topical approach lends itself to a sophisticated presentation of the theories that guide research in the many areas of child development. As the research continues to accumulate, however, the limitations of such theories become evident. For example, developmentalists have found that some of Piaget's classic studies are open to new and intriguing interpretations. Thus, rather than focus on a few grand theories that attempt to account for many aspects of development, we now recognize the value of more specific theories that guide research in particular topic areas, such as language acquisition, motor development, and emotional understanding. Thus, throughout this edition, to supplement the grand theories, we explore newer approaches, such as dynamic systems theory, sociocultural perspectives, and evolutionary theory.

Child Psychology: A Contemporary Viewpoint strives both to be theoretically eclectic and to emphasize the multiply determined nature of development. In each discussion of a topic, one or two causative factors predominate, but others are influential as well. For example, in our discussion of genetics and early development, the predominant factors are biological, but the role of environmental factors in shaping the way genetic predispositions are expressed is emphasized. When we discuss language and gender typing, we emphasize cognitive learning, information processing, and social interaction, but inherited factors take the stage when we explore the biology of gender and the nativist view of language learning. Although cognitive theories such as the information-processing and Piagetian approaches dominate our discussion of intellectual development, we also consider sociocultural processes as contributors to cognitive growth. Similarly, social and affective factors predominate in our coverage of family and peers, but we explore cognitive, behavioral, and biological issues as well. This approach underscores the contemporary recognition that child development evolves out of the interplay among biological, cognitive, social, and emotional factors.

PROCESS ORIENTATION   Our emphasis is on the *processes* of development, a hallmark of contemporary child psychology. Focusing on the processes that generate changes in the child's development enables students to learn what development comprises and what specific changes take place across time. By examining what changes and how, students come to understand why these changes occur. And in this way, they gain insight into why two children with seemingly similar capabilities may develop very different ways of understanding and interacting with the world.

Some of our readers have been curious as to why some sections of our book cover adolescence more fully than others. This approach arises out of our process orientation. When the completion of a developmental process or a milestone in that process occurs in the teenage years, we follow the process from childhood through adolescence. Thus, for example, we discuss physical development through puberty, cognitive development into adolescence, and as part of our exploration of changes in the nature of friendships across time, we follow beginning romantic relationships into adolescence. Because our book focuses, however, on the period of childhood, we do not cover adolescence for all developmental processes.

THEMES OF DEVELOPMENT   This edition of our book continues to characterize theoretical perspectives by focusing on several cross-cutting themes of development. We have trimmed the number of these themes to three: biological versus environmental influences, continuity versus discontinuity of development, and individual characteristics versus contextual and cultural influences. Throughout the book, we illustrate these themes, and in our Epilogue, we link the themes with broad principles that summarize our views about the research and theory-building needs of the field of child development.

Basic and Applied Research: A Reciprocal Relationship

In this book, we present child psychology as a scientific discipline, illustrating the techniques used by psychologists in the field. It is important for students to become familiar with the methodological approaches that are unique to child psychology so that they can understand, interpret, and use the results of research intelligently. We present findings in sufficient detail to enable students not only to understand the steps in the research process but also to appreciate the complex nature of drawing valid conclusions about development.

Although some instructors prefer a basic research focus and others favor an applied approach, we emphasize the interactive nature of basic research and its applications. Basic information about the processes of development can help us understand a wide range of real-life problems, and conversely, insights we gain from applying the results of scientific investigation can help improve research and sharpen our theoretical understanding. In Chapter 10, for example, we consider what the scientific community has learned about the fundamental processes of development from early educational intervention programs like Head Start and similar programs. In Chapter 6, we discuss research on homesickness that demonstrates the relevance of attachment theory for real-life problems. And as we discuss in Chapters 1 and 14, basic research on imitation has helped us understand the effects of television on children's cognitive and social development. Throughout the book, teachers and students will find fascinating examples of the dynamic interplay between basic and applied research.

Sociocultural Diversity in Child Development

In this edition, we have intensified our focus on the cultural, ethnic, and racial diversity of heterogeneous societies like the United States, as well as on differences among cultures around the world. Our expanded discussion of Vygotskian theory, with its strong emphasis on the role of culture, provides a framework for understanding how culture and development interact. We introduce the theme of cultural pluralism in Chapter 1 and have integrated it into every chapter; in each topical discussion, we explore research with the many ethnic groups that make up U.S. culture as well as with people in nations around the world. Although we continue to highlight some particular cultural issues in our Perspectives on Diversity boxes, for the most part we have integrated much of our coverage of cultural contributions to child development into the body of the text to underscore the integral nature of the links between human development and cultural experience.

ORGANIZATION

Several organizational decisions and changes were made in this edition to distinguish our book from other texts in child development. To allow instructors greater flexibility, we have reduced the overall length of the book to better accommodate students and instructors who teach on the quarter system. Beginning in the last edition, we trimmed and combined Chapters 1 and 2 into a single introductory chapter that presents fundamental theoretical and methodological issues in heightened focus. This presentation enables students to move more rapidly into the content chapters. We deleted the chapter on schools, computers, and the media; we continue in this edition to include this material in other chapters, where we tie it more closely to related concepts and issues. For example, the topic of achievement is part of Chapter 10 on Intelligence, and the effects of the mass media on children are now discussed in Chapters 1, 13, and 14. By integrating our presentation of these issues into our discussions of specific developmental outcomes, we are able to explore these matters in more meaningful ways and at the same time reduce the overall length of the book.

SOME HIGHLIGHTS OF THE SEVENTH EDITION

We have rewritten *Child Psychology: A Contemporary Viewpoint* to feature the most recent developments in theory and research. Every chapter includes new information, some of which we highlight below. Beginning with this edition, Mavis Hetherington,

a co-author who guided the development of this book from its first edition in 1975 through the sixth edition, has decided to move on to other interests in her retirement. We recognize her wonderful and thoughtful contributions to this book and to the field of child psychology over many decades. The book is now under the authorship team of Parke and Gauvain. Mary Gauvain, who joined the writing team for the sixth edition, is a respected cognitive developmental psychologist. She continues to bring new depth to our treatments of cognition, information processing, and language learning. Her expertise balances Parke's widely respected coverage of emotional and social development. In addition, Gauvain's expertise in sociocultural approaches and her research on cross-cultural and intracultural variations significantly strengthen coverage of the cultural aspects of development.

In this new edition, we continue to illustrate the profound impact of environmental variations, including culture, on children's development but also highlight the recent advances in genetic and biological assessments that underscore the intricate interplay between genetic predispositions and the environment. In addition, we report on studies that have emerged as a result of recent advances in our ability to measure biological processes such as hormonal activity and new brain-imaging techniques. These new techniques are adding another level of explanation to help us better understand development. We believe that this new edition constitutes a major improvement by offering fresh perspectives that, in turn, make this seventh edition even better and more relevant to students' and instructors' concerns in this new century.

The following are some highlights of the new coverage in this seventh edition:

CHAPTER 1: CHILD DEVELOPMENT: THEMES, THEORIES, AND METHODS

- Theoretical, thematic, and methods discussions presented succinctly so students move quickly into specific-content chapters
- Clear, concise presentation of three major themes of development: biology versus environment, continuity of development versus discontinuity, individual characteristics versus contextual and cultural influences
- Emphasis on research methods that are unique and central to developmental inquiry
- Streamlined overview table of developmental themes and theoretical perspectives

CHAPTER 2: HEREDITY AND THE ENVIRONMENT

- New work on effects, and/or prevention, of genetic diseases such as Huntington's disease, Turner syndrome, and fragile X syndrome
- Role of father's age in the development of Down syndrome
- Updated discussions of new reproductive technology, including the ethical dilemmas
- Updates on the Human Genome Project: identification of protein-coding genes and progress in identifying genes that help account for specific diseases
- New illustrations of the way expression of genes varies with the child's environment
- New research on temperament and later developmental problems for "difficult" babies

CHAPTER 3: PRENATAL DEVELOPMENT AND BIRTH

- New studies of the effects on the fetus of maternal stress, fear, and anxiety
- Recent work on the impact of moderate maternal prenatal alcohol consumption and long-term effects of alcohol on later development
- Updated U.S. and international data on infant mortality rates

- New information on low birthweight and its consequences for preterm infants' development
- New coverage of recent intervention programs for preterm babies, including the effects of infant massage
- Updated information on the international incidence of AIDS in babies and on interventions for these infants
- Recent data on the continuing rise in cesarean deliveries and effects on mothers and subsequent births

CHAPTER 4: INFANCY: SENSATION, PERCEPTION, AND LEARNING

- Updated material on the rapidly expanding areas of infant perception and memory
- Increased coverage of neurodevelopmental approaches to research on infant cognition
- New discussion of infant preparedness, including debates on early learning and biological preparedness
- New research on early object knowledge and processes of infant learning, including imitation
- Recent studies of haptic sensitivity in newborns

CHAPTER 5: THE CHILD'S GROWTH: BRAIN, BODY, MOTOR SKILLS, AND SEXUAL MATURATION

- New research on the association between brain development and musical study and performance
- More focus on latest brain assessment techniques, such as SPECT, fMRI, and TMS, and new evidence of brain plasticity
- Updated material on the genetic and environmental origins of obesity and anorexia nervosa
- New approaches to treating obesity problems
- New research on the benefits of breastfeeding, which supports higher IQ in infants carrying certain genes
- New data on the determinants and impact of early timed puberty

CHAPTER 6: EMOTIONAL DEVELOPMENT AND ATTACHMENT

- New focus on primary and secondary emotions
- New work on the recognition of emotions and the impact of abuse on a child's ability to recognize emotions
- Updated material on jealousy in young children; change over time in children's jealousy reactions
- New work on cross-cultural differences in children's recognition of emotions
- Updated research on attachment relationships between fathers and their children, including hormonal correlates of fathering as well as cross-cultural variations in fathering
- New work on hormonal basis of the detrimental effects of institutionalization on infant parent attachment ("love hormone effect")
- Latest studies on the effects of child care on children, including research on increased aggression among children in child-care facilities

CHAPTER 7: LANGUAGE AND COMMUNICATION

- New research on challenges to the nativist view of language learning
- Expanded coverage of social contributions to language learning, including the contributions of communication to cognitive development

- New research on whether to explain language by a unique cognitive processing system or a general learning system
- Expanded section on young children's queries—especially their "why" and "how" questions
- New research on the role of gesture in early communication
- Increased coverage of bilingual development
- Additional coverage of metalinguistic awareness, including monitoring of speech

CHAPTER 8: COGNITIVE DEVELOPMENT: PIAGET AND VYGOTSKY

- Recent research examining the predictions of Piagetian theory, especially in the sensorimotor and preoperational stages
- Greater coverage of social cognition, including theory of mind and understanding of intentions
- Expanded and updated section on research stemming from Vygotsky's approach, including classroom designs based on a sociocultural approach to cognitive development
- Updated section on cultural contributions to cognitive development, including the role of tools in intellectual development

CHAPTER 9: COGNITIVE DEVELOPMENT: THE INFORMATION-PROCESSING APPROACH

- Updated discussion of basic assumptions and models of information-processing theory
- Greater discussion of how changes in knowledge contribute to cognitive development
- Expanded coverage of cognitive tools, including symbolic and material supports for thinking
- Updated discussion of attention, including the role of attention in planning
- Recent research on memory, including organization and strategy development

CHAPTER 10: INTELLIGENCE

- Updated and expanded discussion of intelligence testing, including recent developments in testing infant intelligence
- Updated and expanded discussion of how ethnicity, cultural experience, and social class relate to IQ testing
- New material on changes in IQ over time, including recent research on the Flynn effect
- Updated section on achievement motivation and creativity in children
- Expanded discussion of intellectual development among exceptional children

CHAPTER 11: THE FAMILY

- New work on coparenting and alliances among family members
- New data on ethnic variations in child-rearing and the role of neighborhood risk
- Updates on incidence of pregnancy and STDs among teenagers
- New data on the effects of parental age and parenting knowledge and practices
- Recent trends in international adoptions and the beneficial and detrimental effects of adoption
- New information on child abuse and neglect and the long-term effects of sexual abuse on children

CHAPTER 12: EXPANDING THE SOCIAL WORLD: PEERS AND FRIENDS

- New evidence of toddler social skills and their abilities to function in triadic situations
- Fresh perspectives on types of popular children
- New information on peer rejection and victimization
- New research on how close, same-gender friendships differ between boys and girls
- New evidence on romantic relationships among teenagers
- New data on whether parents or peers have more influence on children's behavior and cross-cultural variations in peer relationships

CHAPTER 13: GENDER ROLES AND GENDER DIFFERENCES

- Integration of recent evolutionary perspectives on the basis of gender differentiation
- New focus on Hyde's similarity hypothesis to provide a balanced portrait of gender similarities and differences
- Discussion of why girls continue to drop out of math courses in both the United States and internationally
- New research on the effects of fetal androgen effects
- New data on siblings as shapers of gender identity
- New material on the effects on girls of a father's absence or unavailability
- New section on development of same-sex orientation and identity during childhood and adolescence

CHAPTER 14: MORALITY, ALTRUISM, AND AGGRESSION

- More focus on morality in individualistic and collectivist cultures
- New work on the neuroimaging correlates of Gilligan's care versus justice approach to moral development
- New work on the affective side of morality and the development of guilt in children
- New material on children's understanding of freedom of speech, civil rights, and religion
- More work on the biological basis of prosocial behavior, including recent neuroimaging studies
- New material on the closing gender gap in victims of violent actions
- New work on the effects of violent video games on aggression and new neuroimaging correlates of exposure to film violence

CHAPTER 15: DEVELOPMENTAL PSYCHOPATHOLOGY

- New national and ethnic trends in children's substance abuse
- Updates on the symptoms and treatment of attention deficit/hyperactivity disorder
- Updates on suicide rates among various ethnic groups, especially Native American youth
- Update on the genetic and biological roots of autism, such as chromosomal abnormalities and brain chemistry differences
- Cross-time prevalence rates for autism and reasons for the increase
- Updates regarding the rate of mental health problems among affluent adolescents

SPECIAL FEATURES

In this edition, we have expanded and refined our special features and now present nearly all illustrations in full color.

CHAPTER OUTLINES AND SUMMARIES Our chapter outlines facilitate students' survey of a chapter's contents and our comprehensive, bulleted summaries reiterate the chapter's main ideas.

BOX PROGRAM   Our boxed discussions highlight three important themes: the application of basic research to real problems of children's lives, the importance of understanding and supporting children's resilience in the face of risk, and the similarities and differences among children of many different cultures and ethnicities.

BOX 3-1
Child Psychology in Action

PRENATAL HEALTH CARE AND INFANT MORTALITY

It seems astonishing that more babies die at or soon after birth in the United States than in 21 countries worldwide (March of Dimes Foundation, 2001). After all, U.S. medicine and technology lead the world. Why, then, are our infant mortality rates so high? The answer is tied in large part to our less than adequate provision of prenatal health care to pregnant women (Children's Defense Fund, 2005).

In any 1 of 10 Western European countries—Belgium, Denmark, England, France, Germany, Ireland, Netherlands, Norway, Spain, and Switzerland—pregnant women automatically receive prenatal and postnatal care at very little cost because it is subsidized by their governments; they also get from 9 to 40 weeks of paid maternity leave from work.

Many pregnant women in the United States face a difficult situation. There are no uniform national standards to guarantee them either consistent high-quality maternity care or, of equal importance, financial coverage. Nationwide, at least 1.3 million U.S. women receive insufficient prenatal care each year, and many of these women are those who need this care most (Healy, 1995). The groups least likely to receive care are teens, unmarried, poor, less educated, recent immigrants, and minorities. These women are at greatest risk of bearing babies with complications such as prematurity and low birthweight.

Reasons women do not seek prenatal care include motivational and multiple social problems (Young et al., 1989). For example, in one study, African American women in particular reported problems with scheduling and keeping appointments for prenatal care as a reason for delaying such care, whereas European Amer-

icans often noted that they didn't feel they needed prenatal care. Scheduling difficulties were more often cited by women under age 20 than by older women. Social problems most often cited were unemployment (presumably implying a lack of money), being a single parent, psychological stress, interpersonal conflicts with the baby's father, and family crises. Another reason may be women's fear or dislike of doctors (DiMatteo & Martin, 2001; Kotelchuck, 1995).

Having social support may not guarantee that a woman will seek medical help and guidance during the prenatal period. In one study, researchers found that women who were enclosed within strong, mostly familial networks were less likely to seek prenatal care (St. Clair et al., 1989).

Within the United States, the rates of fetal and neonatal deaths have generally declined, but over the years, the rates for African American infants have remained about twice those for European Americans (Children's Defense Fund, 2005).

What can we do about this situation? The resistance in the United States to national health standards or a national health-care system has been monumental. As a result of this resistance and of the marked discrepancy between the wealthy and poor sectors of the population, many poor mothers either have no access to prenatal care or do not take advantage of opportunities they do have. In view of the costs, both emotional and financial, of high infant mortality and high rates of premature ... make prenat... all racial, eth...

Child Psychology in Action boxes pick up the thread of our research-application theme, focusing on how the results of basic research can be applied to the solution of problems in children's development. For example, in Chapter 2, "The Human Genome Project" reports both the latest developments in describing the human genome and the implications of this work for the treatment of disease and disorders. In Chapter 9, "Should Young Children Testify in Court?" shows that although children's memory may be accurate, children are susceptible to such influences as the circumstances under which they acquired the original information and the characteristics of the person who later interviews them.

Risk and Resilience boxes explore the sometimes astounding resilience that children can display in the face of a wide variety of risks, including physical and mental disabilities, disease, poverty, deteriorated neighborhoods, and broken or dysfunctional families. These discussions focus not only on how we can support and encourage such resilience but how we can work to alleviate or eliminate the risk factors. For example, in Chapter 3, "What Factors Help Children Overcome Early Adversity?" focuses on Emmy Werner's classic and continuing work on risk and resilience on Hawaii's island of Kauai. In Chapter 7, "Children at Risk for Failure to Develop Language" discusses the System for Augmenting Language developed by Mary Ann Romski and Rose Sevcik, by which nonspeaking children with mild to severe mental retardation have been able, for the first time, to communicate with others by using a system of lexigrams and a computerized keyboard.

BOX 1-1
Risk and Resilience

CHILDREN OF THE GREAT DEPRESSION

What happens to children when economic disaster strikes? To find out, Elder and Shanahan (2006) studied children who, at the time of the Great Depression, were part of an ongoing longitudinal study in California of social and intellectual development. Some of the children were just entering school when the U.S. economy collapsed; others were teenagers.

Dramatic changes in family roles and relationships affected children's development, especially in the more economically deprived families. As fathers' jobs disappeared and family income dropped, mothers entered the labor market. As a result, the mother's power increased, and the power and emotional significance of the father decreased. The rates of divorce, separation, and desertion rose, especially among couples whose relationship was shaky before the onset of the depression (Elder & Shanahan, 2006).

Roles changed for children, too. Girls did more household work, and older boys took more outside jobs. Parent-child relationships also changed; fathers especially became more punitive, less concerned about, and less supportive of their children. Boys tended to move away from the family, becoming more peer-oriented. Both boys and girls were moodier and less calm (Elder & Shanahan, 2006). Because younger children were more dependent on their parents and thus exposed to the altered situation at home for a longer period of time, the effects of the Depression were greater for children who were young when the catastrophe struck.

Many of the effects on children were long lasting. When these children became adults, the boys who were forced to enter the job market as teenagers preferred secure but modest jobs over riskier but higher status positions. Women with childhood difficulties during the Depression often married men who were lacking in

ambition; girls who were prone to temper outbursts as children became ill-tempered parents (Elder & Shanahan, 2006). Thus, we see a three-generational impact of the Depression. Economic hardship left its imprint on the lives of many of these families. However, some families managed well in spite of economic hardship, particularly if family ties were strong before the onset of the Depression.

These children, shown on their Missouri farm in 1940, were among the many whose families, whether on farms or in urban tenements and ghettos, were victims of the Great Depression. Although the stock market crash of 1929 triggered an economic collapse that hit its peak by 1933, the U.S. economy did not fully recover until the country began heightened defense spending in 1941, just before entering the Second World War.

BOX 11-2
Perspectives on Diversity

PARENTAL CHILD-REARING STYLES CARRY DIFFERENT MEANINGS IN DIFFERENT CULTURES

There may be more than one explanation of why Asian American students outstrip European American and other cultural groups in academic performance. As we discuss elsewhere, Steinberg and his colleagues (1991, 1992) have proposed that the character of the peer groups with whom Asian and other students identify and socialize makes the difference; Asian students on average are more supportive of academic achievement. According to Ruth Chao (1994, 2001), however, other much earlier factors in children's lives may also be at work. It seems likely that the supportive Asian peer group is reflecting a kind of child-rearing that has no real U.S. equivalent.

In response to the finding that Chinese parents score high on U.S. psychologists' "authoritarian" scales, Chao points out that *authoritarian* does not mean in Chinese what it means in English. Thus, when Chinese parents get such high scores, they may be expressing behavior patterns that are quite different from the U.S. patterns that illustrate this concept. Moreover, this culturally based difference may hold also for parents from other Asian cultures who espouse such Confucian principles as family unity and respect for elders and may help explain why Asian American students typically do better in school than other U.S. students. (Confucius was a Chinese philosopher of the 6th to 5th centuries B.C. whose system of ethical precepts informs modern-day Confucianism.)

Whereas the American concept of authoritarianism subsumes many quite negative beliefs, attitudes, and behaviors (see Table 11-1), the Chinese style of parenting characterized by the concepts of *chiao shun* ("training") and *guan* ("to govern") requires a high degree of involvement with the child, physical closeness to the child, and devotion—mainly by the mother—of a great amount of time and effort. These concepts subsume teaching or educating children, focusing particularly on children's performance in school (for it is the Chinese belief that education is the key to success), and also connote "loving" and "caring for" the children. In this sense, these notions are antithetical to the concept of authoritarianism as it is defined in Western society. As Chao (1994) suggests, the seemingly restrictive behaviors that cause Asian parents to get high scores on Western scales may be equated with parental concern, caring, and involvement, and Asian parental control may reflect a more organizational effort designed to keep the family running smoothly and to foster family harmony.

It seems likely that the Chinese concepts of *chiao shun* and *guan* may actually resemble authoritativeness more than authoritarianism. The major difference between Chinese and Western concepts is the U.S. emphasis on soliciting the child's opinions, considering her wishes, and offering her alternatives (Table 11-1). As Chao (2001) points out, the Chinese notion of the self does not emphasize independence and autonomy, as the Western notion does. Instead, it derives from the Confucian notion of *jen* ("humanity" or "humankindness"), which holds that human beings are bound to one another and defined by their relationships with one another. For Chinese—and many other Asian—parents, adhering to social rules of conduct and interaction and developing a sensitive knowledge of others and their expectations are more crucial than focusing on the free expression of internal attitudes, feelings, and thoughts. Whereas the Western child is socialized to achieve according to some internalized standards of excellence, the Chinese child is encouraged to achieve according to family and social norms and expectations (Chao, 1995, 2001). These studies underscore the importance of recognizing how different cultures interpret various child-rearing practices.

To return to the suggestion by Steinberg and his colleagues that peer group support explains why Asian students excel in school despite their "authoritarian" upbringing, it is just possible that the peer groups are reflecting the *chiao shun* and *guan* that these peers have received from their parents. In effect, then, they support a given child's motivation and endeavor to achieve because they have the same parent-taught motivation and belief in hard work.

Perspectives on Diversity boxes tie in with another of our major themes, examining research on the development of children's abilities, behaviors, and skills in different cultural communities throughout the world and among children of the many different cultural groups who make up the U.S. population. These applications recognize the increasing importance of understanding and respect for all peoples, attitudes that need to be rooted in the world of the child. For example, in Chapter 14, "Justice Versus Interpersonal Obligations: India and the United States" demonstrates that Hindu Indians are much more likely to accord interpersonal considerations importance in making moral judgments than are Americans. However, in this edition, we have reduced the number of these boxes and integrated much of the cultural material into the ongoing narrative of the text.

KEY TERMS AND MARGIN GLOSSARY We have carefully reviewed key terms and have included some additional terms that we consider crucial to the student's learning of new material. These terms are set in boldface type and are repeated, with their definitions, on the same page in a margin glossary; the terms and their definitions also appear in the alphabetized Glossary at the back of the book. Terms that may be unfamiliar to students but that are not crucial to learning the material are shown in the text in italics.

sudden infant death syndrome (SIDS) The sudden, unexplained death of an infant while sleeping; also called *crib death*.

REM sleep REM, or rapid eye movement, sleep is characterized by rapid, jerky movements of the eyes and, in adults, is often associated with dreaming.

Researchers have used brain-recording techniques when infants sleep, and they have distinguished different phases of the infant sleep cycle. One distinction that has been identified is between **REM sleep** and *non-REM sleep*. REM, or rapid eye movement sleep, is often associated with dreaming because in adults it is during dreaming that the eyes, under closed eyelids, have been observed to dart around in rapid, jerky movements. Although infants also have REM sleep, there is presently no way of knowing if infants dream.

In addition to rapid eye movement, REM sleep is characterized by fluctuating heart rate and blood pressure. The full purpose of REM sleep is unknown, but we do know that it has functional value: If people are awakened repeatedly as they begin REM sleep and thus are prevented from obtaining this type of sleep, they tend to be irritable and disorganized during their later waking hours.

Compared to adults and older children, newborns have a lot of REM sleep. In newborns, 50% of sleep is REM sleep. As children age, REM sleep declines to about 20% (Ingersoll & Thoman, 1999). By the age of 18 and onward through adulthood, most people sleep about 8 hours a day, and of that amount, only about an hour and a half is REM sleep.

Making the Connections 4

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 4 and discussions in other chapters of this book.

Chapter 4
Infancy: Sensation, Perception, and Learning

Infant imitation is informed by social learning theory.
In Chapter 1, "Child Development: Themes, Theories, and Methods," p. 11

Infant ability to develop regular sleep patterns is linked with temperament.
In Chapter 2, "Heredity and the Environment," p. 65

Infants' perception of faces is linked with their ability to develop close relationships with caregivers.
In Chapter 6, "Emotional Development and Attachment," p. 414
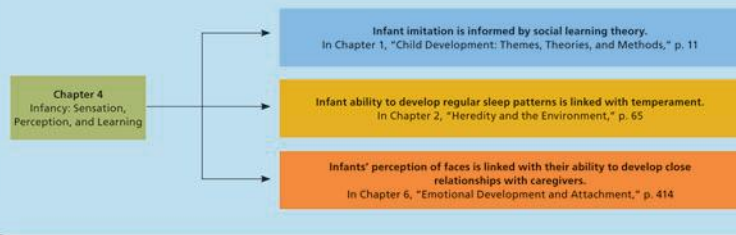
"MAKING THE CONNECTIONS" GRAPHICS End-of-chapter diagrams enable the student to relate discussions in one chapter to topics explored in other chapters. These graphics underline the interrelatedness of issues across different domains of development.

"EXPLORE AND DISCUSS" STUDY QUESTIONS Study questions appear at the end of each chapter. Our aim is to promote creative and critical thinking about the issues discussed in each chapter.

EXPLORE AND DISCUSS

1. What is the practical value of knowing about the young infant's sensory abilities? How might this information help in the early detection of problems and in the design of useful interventions to help children?

2. Based on your newly gained knowledge of infants' sensory and perceptual capacities, do you think "the amazing newborn" is an appropriate description? Explain your answer.

3. How do you think infants' visual and auditory abilities help them form relationships with their caregivers?

4. What would you tell a friend about the infant's ability to learn and remember new information?

Turning Points

SOME COGNITIVE ACHIEVEMENTS AS SEEN FROM THE INFORMATION-PROCESSING VIEW

1 YEAR
- Has limited attentional capacity; can attend to a toy for only a few seconds
- May have a rudimentary understanding of categories

2 YEARS
- Has increased attentional capacity; will spend more than 8 seconds with a single toy
- Can use external supports such as landmarks to find hidden toys
- May be able to use basic category labels to help remember things
- May be able to draw very simple analogies
- Relies on scripts of familiar events

3 YEARS
- Can use two rules in combination
- Often distracted by other things while watching TV but, when attention is fully engaged, may be quite attentive to a program
- May use analogies in solving a problem
- Understands relations between scale models and real objects

4 YEARS
- With a meaningful context and guidance in using simple strategies, can focus attention on relevant aspects of the environment and apply the information gained to a task
- Can combine two or more rules into a higher order rule
- Knows that long lists are harder to remember than short lists
- Understands that if you try harder on a more difficult task, you may succeed

5 YEARS
- Can memorize four units in a digit-span test
- Understands that thinking has content, that it is different from both perception and knowing, and that only people (and perhaps some other animate organisms) can think; can sometimes infer thinking in others if the evidence is strong

6 YEARS
- Begins to find audio content of TV programs as interesting as visual content
- With enough cues, may be able to plan a very effective strategy of attention

7 YEARS
- With training, may score as well on a test of recall as 12-year-olds

10 YEARS
- Becomes more selective in searching for information needed to make decisions

11 YEARS
- Begins to spend less time processing irrelevant information

12 YEARS
- Can memorize six or seven units in a digit-span test

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental changes.

Sources: Flavell et al., 1993b; Siegler, 1998.

"TURNING POINTS" CHARTS These charts help students view children's evolving skills and abilities in terms of their chronology over the child's development. The charts, which record what is *typical* but do not take account of individual differences, appear in Chapters 3 through 8 and 12 through 14. We also highlight the chronologies of various specific evolving characteristics and skills in briefer tables throughout the book.

UPDATED RESEARCH As our book title, *Child Psychology: A Contemporary Viewpoint,* promises, we provide the most up-to-date perspectives on the field. Of over 2,000 references, close to 600 are new to the book and most refer to 21st century work. In turn, we have deleted nearly 900 older references to make room for more up-to-date citations. We continue to include research classics when they provide the frameworks for recent studies and help understand contemporary research.

ILLUSTRATION PROGRAM We have expanded our program of illustrations and have revised many graphics and tables to achieve better clarity. Almost all of our photographs are now in full color and clear captions help students understand figures and photos and relate data to text discussions.

SUPPLEMENTS

A complete package of multimedia and ancillaries has been prepared for this book. The supplements listed here may accompany the seventh edition of *Child Psychology: A Contemporary Viewpoint*. Please contact your local McGraw-Hill representative for details concerning policies, prices, and availability, as some restrictions may apply.

For the Instructor

ONLINE LEARNING CENTER FOR INSTRUCTORS

http://www.mhhe.com/parke7e

The password-protected instructor side of the Online Learning Center contains the Instructor's Manual, Test Bank files, PowerPoint slides, Image Gallery, and other valuable material to help you design and enhance your course. See more information about specific assets below. Ask your local McGraw-Hill representative for password information.

INSTRUCTOR'S MANUAL   Susan Perez, University of North Florida

This comprehensive resource is designed around a list of Learning Objectives that correspond with those in the Test Bank and the student Online Learning Center, forming a cohesive instructional package. In the Instructor's Manual, you will find chapter outlines, lecture topics, class discussions, and demonstrations with handouts included. The manual also facilitates the integration of the textbook's boxed features (Child Psychology in Action, Risk and Resilience, and Perspectives on Diversity) into your lectures. Finally, each chapter includes a list of Supplementary Readings and a guide to multimedia resources.

TEST BANK   Rhonda Frazelle, State Fair Community College

Each Test Bank chapter includes the list of Learning Objectives, which correlate to those in the Instructor's Manual and the student Online Learning Center. The Test Bank provides more than 1,500 multiple-choice, short answer, and essay questions. Additionally, each multiple-choice question includes the answer, the type of question (factual, conceptual, or applied), the learning objective it addresses, and the page in the main text where the corresponding material is presented. All questions are compatible with EZ Test, McGraw-Hill's Computerized Test Bank program.

McGraw-Hill's EZ Test is a flexible and easy-to-use electronic testing program that allows instructors to create tests from book-specific items. It accommodates a wide range of question types and allows instructors to edit existing questions or create new ones. Multiple versions of the test can be created, and any test can be exported for use with course management systems such as WebCT or Blackboard. EZ Test Online is a new service that gives you a place to easily administer your EZ Test–created exams and quizzes online. The program is available for Windows and Macintosh environments.

POWERPOINT SLIDES   Linda Ann Butzin, Owens Community College

The *Child Psychology* seventh edition PowerPoint presentations cover the key points of each chapter, serving as a springboard for your lectures. They can be used as is, or you may modify them to meet your specific needs.

MCGRAW-HILL'S VISUAL ASSET DATABASE FOR LIFESPAN DEVELOPMENT ("VAD")   McGraw-Hill's Visual Assets Database for Lifespan Development (VAD 2.0) (www.mhhe.com/vad) is an online database of videos for use in the developmental psychology classroom, created specifically for instructors. You can

customize classroom presentations by downloading the videos to your computer and showing the videos on their own, or insert them into your course cartridge or Power-Point presentations. All of the videos are available with or without captions. Ask your McGraw-Hill representative for access information.

MULTIMEDIA COURSEWARE FOR CHILD DEVELOPMENT Charlotte J. Patterson, University of Virginia
This video-based set of two CD-ROMs covers classic and contemporary experiments in child development. Respected researcher Charlotte J. Patterson selected the content and wrote accompanying modules that can be assigned to students. These modules include suggestions for additional projects as well as a testing component. Multimedia Courseware can be packaged with the text at a discount.

MCGRAW-HILL CONTEMPORARY LEARNING SERIES
Annual Editions: Human Development This reader is a collection of articles on topics related to the latest research and thinking in human development. Annual Editions are updated regularly and include useful features such as a topic guide, an annotated table of contents, unit overviews, and a topical index.

Taking Sides: Clashing Views on Controversial Issues in Life-Span Development Current controversial issues are presented in a debate-style format designed to stimulate student interest and develop critical thinking skills. Each issue is thoughtfully framed with an issue summary, an issue introduction, and a postscript.

Notable Selections in Human Development This book is a collection of articles, books excerpts, and research studies that have shaped the study of human development and our contemporary understanding of it. The selections are organized topically around major areas of study within human development. Each selection is preceded by a headnote that establishes the relevance of the article or study and provides biographical information on the author.

For the Student

ONLINE LEARNING CENTER FOR STUDENTS Elaine Cassel, Lord Fairfax Community College
http://www.mhhe.com/parke7e
The student side of the Online Learning Center provides a variety of learning tools, including short video illustrations of key concepts in each chapter—footage of children engaged in activities described in the text; interviews with children, teens, and parents; and comments from experts on various child development topics. Other resources on this site include practice quizzes, Learning Objectives that match those in the Instructor's Manual and Test Bank, chapter outlines, Key Term flashcards, and Web links for each chapter.

ACKNOWLEDGMENTS

Child Psychology

A Contemporary Viewpoint

Pablo Picasso (1881–1973). *Claude With Horse*, 1949.

1.

Child Development: Themes, Theories, and Methods

Two-year-old Peter has a pile of blocks in front of him of all shapes, sizes, and colors. He can put all the red blocks in one group and all the blue ones in another, but he does not sort the blocks by their shape. By the time he's 5, he will be able to sort a collection of objects, such as these blocks, along several dimensions at the same time. For example, he will be able to put all the triangular blocks in one group arranged by color. When he is 7 or so, he will be able to organize objects and other types of new information in even more complex ways, and he will be able to think ahead about what organization may be best for his current needs. For example, if his teacher gives him a list of words, he will know that to learn the words more efficiently he can put them into groups such as items of clothing (*shirt, shoes*), parts of the body (*eyes, nose*), and food (*carrot, apple*).

Christine, who is a year and a half, plays with her toys next to another child. She doesn't talk to the other child or interact with her except, perhaps, to grab one of her companion's toys. At this age, Christine has difficulty taking into account the other child's perspective. In contrast, when Christine is 6 or 7, she will often engage in group play and she will understand that people have different points of view. By the time she is in her middle teens, Christine will understand social life in even more complex ways, including the need for positive human relationships and the concepts of societal law and order.

What accounts for the gradual but steady change in a child's ability to understand and create complex patterns, to learn new information, and to interact with and feel responsibility toward other people? The field of **child development**, a subarea of the discipline of developmental psychology, seeks to answer these questions in two major

child development A field of study that seeks to account for the gradual evolution of the child's cognitive, social, and other capacities first by describing changes in the child's observed behaviors and then by uncovering the processes and strategies that underlie these changes.

ways. First, it tries to identify and describe *changes* in the child's cognitive, emotional, motor, and social capacities and behaviors from the beginning of life through adolescence. Second, the field attempts to uncover the *processes* that underlie these changes to understand how and why they occur. In other words, developmental psychologists are interested in *what* things change as children get older and *how* these changes come about. To understand the changes and processes that underlie child development, researchers devise theories, design and carry out empirical studies to test these theories, and suggest practical applications based on their research. This chapter introduces the field of child development by describing the main theories and the methods used by developmental scientists to uncover the fascinating process of human psychological growth.

Although research in child development plays a significant role in the general field of psychology, this subdiscipline is a relatively young enterprise. It got its start barely a century ago, when the topic drew the attention of scholars from various regions of the world. One of the most notable was Charles Darwin, who conducted research on infants' sensory capacities and young children's emotions (Cairns & Cairns, 2006). In fact, our appreciation of childhood as a unique phase of life is a relatively modern phenomenon. For most of recorded history, little was written about children or childhood (Aries, 1962). By and large, people viewed children as miniature adults—a view that affected the way adults treated children at the time. For example, in earlier historical periods, children were often laborers in the fields, factories, and mines. It was not until the late nineteenth century that child labor laws were introduced to protect children from this kind of exploitation. Today, in the twenty-first century, the scientific study of child development plays a central role in psychological research. This research has influenced children's everyday experiences as well as social policy and legislation relevant to children and families, such as the establishment of compulsory schooling and improvements in nutrition and health care.

Better information about child development can help society protect and advance the well-being of children (Renninger & Sigel, 2006). Research findings can lead to helpful advice on a wide range of current issues, from creating and selecting effective day-care programs to dealing with the effects on children of such things as poverty and media violence. Information on normal child development can also contribute to efforts to prevent and treat developmental difficulties.

To understand the scientific study of child development, it is important to appreciate the central themes of development that underlie current theory and research. It is also important to be familiar with the main theoretical views that guide this research and the methods that are used. Throughout our exploration of contemporary child psychology, we discuss how we can use what we learn to improve children's functioning and opportunities for development in important areas of their lives, especially relationships with family, friends, and peers; academic pursuits; and personal development.

Proposing one of the first theories of children's emotional development, Charles Darwin (1809–1882) based much of his theorizing on his infant son's earliest emotional expressions. Although Darwin is more widely known for his theory of evolution, his work on children's emotional behavior continues to have considerable influence on the field of child development.

THEMES OF DEVELOPMENT

As scientists have studied children's development, they have examined and debated three key issues or themes pertaining to psychological growth. These themes concern the origins of human behavior, the pattern of developmental change over time, and the individual and contextual forces that define and direct child development. We will encounter these three themes repeatedly throughout the book as we discuss the many aspects of development—biological, cognitive, linguistic, emotional, and social. In this chapter, we describe each of

these themes and we use them to discuss the main theories of child development that underlie contemporary research.

Origins of Behavior: Biological Versus Environmental Influences

Most contemporary theories recognize that both biological and environmental factors influence human development, but they disagree about the relative importance of each of these factors for development or the balance between the influences. In the early years of the field, some psychologists held strictly biological or environmental views. Psychologists such as Arnold Gesell (1928) believed that the course of development was largely predetermined by biological factors. In his research, Gesell concentrated on **maturation**, or the natural unfolding of development over the course of growth. Other early theorists, such as the behaviorist John B. Watson, placed their emphasis strictly on the environment. Watson (1928) assumed that biological factors placed no restrictions on the ways that the environment can shape the course of a child's development. In fact, he claimed that by properly organizing the environment, he could produce a genius or a criminal.

maturation A genetic or biologically determined process of growth that unfolds over a period of time.

Today, there are no theories that support either of these extreme positions. Instead, modern developmentalists explore how biological and environmental factors, or nature and nurture, interact or work together to produce developmental variations in different children. Research on child maltreatment, for example, finds that children with certain genetic characteristics are more likely to exhibit behavior problems than are children who do not have these characteristics (Plomin et al. , 2001). When children with these genetic dispositions live in abusive environments, they are more likely to be maltreated than other children. Thus, the *combination* of the child's biological characteristics, the way he or she expresses these characteristics behaviorally, and the abusive environment itself puts a particular child at risk.

Children intentionally try to understand and explore the world about them. The active nature of the human organism supports interaction between biological propensities and the environment over the course of development (Kuczynski, 2003). Also, socializing agents such as parents, peers, or teachers do not simply mold the child; instead, children actively influence and modify the actions of their parents and other people with whom they interact. Thus, the interaction between biology and environment is an active, dynamic process in which the child also contributes to the process.

Pattern of Developmental Change: Continuity Versus Discontinuity

Another major question that confronts developmental psychologists is how to describe the pattern of developmental change. Two basic patterns are debated. Some psychologists view development as a continuous process whereby each new event builds on earlier experiences (Figure 1-1a). In this view, development is a smooth and gradual accumulation of abilities. Developmental changes add to or build on earlier abilities in a cumulative or quantitative way without any abrupt shifts from one change to the next. For many behaviors, this seems like an apt explanation. For example, as we learn a new skill—let's say how to swim—we usually observe gradual improvement from day to day. However, sometimes we notice an abrupt change in our ability. Whereas yesterday we were swimming competently, today it seems as if some big improvement has occurred—all our practice seems to have finally paid off. Compared with the earlier more incremental changes, our more recent changes seem more qualitative in nature, and our smoother or more rapid swimming stroke now bears little resemblance to the
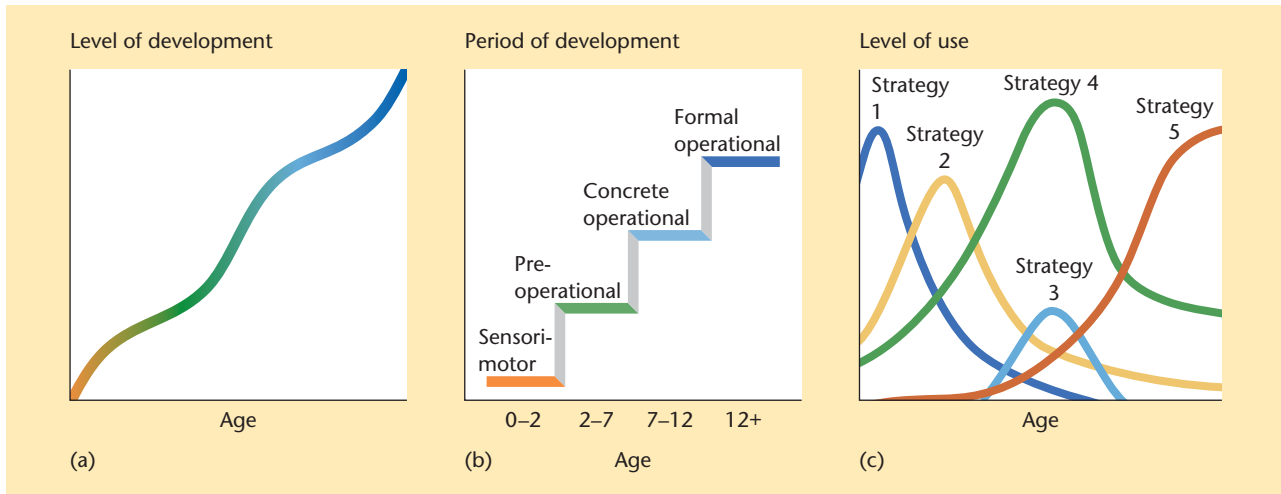
Figure 1-1   Continuity and discontinuity in the child's development

The continuous view (a) sees development as a gradual series of shifts in capacities, skills, and behavior with no abrupt changes. A discontinuous view (b) proposes abrupt, steplike changes that make each stage qualitatively different from the one that precedes it. Most contemporary developmentalists embrace a third view, which holds that development is fundamentally continuous but interspersed with transitions that may appear to be sudden or abrupt. For example, Siegler's "overlapping waves" model (c) suggests that children use a variety of strategies in thinking and learning at any given age. The use of each strategy ebbs and flows with increasing age and expertise, and only gradually do the most successful strategies predominate. As a result, from a long-range perspective, development appears generally continuous, but using a closer examination, we can observe specific qualitative changes.

Source: Part (c) from Siegler, Robert S.; Alibali, Martha W., *Children's Thinking*, 4th Edition, © 2005. Adapted and reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ.

choppy, halting strokes we had when we first began to swim. This latter type of change is of interest to developmental psychologists who view development as discontinuous. This view likens development to a series of discrete steps or stages in which behaviors get reorganized into a qualitatively new set of behaviors (Figure 1-1b).

Most contemporary child researchers see development as basically continuous or quantitative but sometimes interspersed with periods of change that are discontinuous or more qualitative (Figure 1-1c). Some recent research aims to understand how behavioral continuities are sustained or disrupted by an individual's experiences. Although a disruption to behavioral continuity may sound problematic, it may not be. For example, Rutter, Kreppner, and O'Connor (2001) have investigated how children who were reared early in life in deprived institutional settings experienced positive change after they were adopted into healthy families.

Forces That Affect Developmental Change: Individual Characteristics Versus Contextual and Cultural Influences

Child development occurs in a variety of settings. Do children behave similarly across a broad range of situations, or do the contexts in which children live affect how they behave and even how development occurs? Developmental psychologists differ in their emphasis on individual characteristics versus situational or contextual influences. Many resolve the controversy by adopting an *interactionist* viewpoint, stressing the dual role of individual and contextual factors (Magnusson & Stattin, 2006). For example, children with aggressive personality traits may often seek out contexts in which they can display these characteristics; thus, they're more likely to join a gang or enroll in a karate class than to opt for the church choir or a chess club (Bullock & Merrill, 1980). But

these same children, in settings that don't allow or promote aggressive behavior, such as a choir or chess club, may be less likely to behave aggressively and perhaps even be friendly and cooperative.

RISKS TO HEALTHY DEVELOPMENT AND INDIVIDUAL RESILIENCE   One very important way individual characteristics have been studied is by examining how different children respond when they are confronted with situational challenges or risks to healthy development. Risk can come in many forms. Some risks are biological or psychological—for example, a serious illness or living with a psychotic parent. Other risks are environmental, such as family income or the child's experience at school. Individual children respond to such risks in different ways. Many seem to suffer permanent developmental disruptions. Others show "sleeper" effects; they seem to cope well initially but exhibit problems later in development. Still others exhibit resilience and are able to deal with the challenge. And some children, when they confront new risks later in life, seem better able to adapt to challenges than children who have experienced little or no risk (Cummings et al., 2000; Luthar et al., 2000).

RESEARCHING ACROSS CULTURES   Researchers who emphasize contextual influences on development have studied a range of settings, including the home, the neighborhood, and the school. Examination of the contribution that context makes to child development has also led to increased interest in how culture relates to development. We know that children who grow up on a farm in China, in a kibbutz in Israel, in a village in Peru, or in a suburb in the United States have very different kinds of experiences that influence their development. For example, in some cultures, children are encouraged to walk very early and are given opportunities to exercise their new motor skills. In other cultures, infants are carried or swaddled for long periods of time, which reduces their chance to walk until they are older. Examining child development across cultures provides information about variation in the range of human potential and expression that may emerge in different circumstances of growth (Rogoff, 2003). Moreover, cultures differ not only across national boundaries but also within single countries. The United States, Australia, and Russia, for example, all contain a wide range of subcultural groups representing very diverse racial and ethnic traditions (Demo et al., 2000).

The three themes we've been discussing—biological versus environmental origins, continuous versus discontinuous patterns of growth, and individual versus contextual influences on development—have inspired several different theories about child development. In the next section, as we discuss the main theoretical perspectives on child development, we will describe how each theory takes these three themes into account.

THEORETICAL PERSPECTIVES ON DEVELOPMENT

It is not sufficient that a developmental theory simply focuses on children. What is critical is that a theory describes psychological change or development over time (Miller, 2002). Theories serve two main functions that are crucial to the science of developmental psychology. First, they help organize and integrate existing information into coherent, interesting, and plausible accounts of how children develop. Second, they generate testable hypotheses or predictions about children's behavior.

In the field of child psychology today, no single theory dominates the field. Also, as you will see, each theory is framed by specific questions about development, and therefore, it focuses on particular aspects of development that are relevant to these questions. In addition, different theories favor particular methods or ways of studying development.

structural-organismic perspectives Theoretical approaches that describe psychological structures and processes that undergo qualitative or stagelike changes over the course of development.

psychodynamic theory In this view of development, which is derived from Freudian theory, development occurs in discrete stages and is determined largely by biologically based drives shaped by encounters with the environment and through the interaction of the personality's three components—the id, ego, and superego.

id In Freudian theory, the person's instinctual drives; the first component of the personality to evolve, the id operates on the basis of the *pleasure principle.*

ego In Freudian theory, the rational, controlling component of the personality, which tries to satisfy needs through appropriate, socially acceptable behaviors.

superego In Freudian theory, the personality component that is the repository of the child's internalization of parental or societal values, morals, and roles.

psychosocial theory Erikson's theory of development that sees children developing through a series of stages largely through accomplishing tasks that involve them in interaction with their social environment.

Piagetian theory A theory of cognitive development that sees the child as actively seeking new information and uses two basic principles of biology and biological change: organization and adaptation.

In the following sections, we group the main theories of development in relation to five general approaches in the field. These are (a) structural-organismic, (b) learning, (c) dynamic systems, (d) contextual, and (e) ethological and evolutionary views. Our aim is to provide an overarching perspective that presents the commonalities and differences across these various theories. However, we recognize that there are other ways to group the theories. We also aim to give you a sense of the breadth and diversity of different theoretical approaches to child development. We begin this section by discussing two of the earliest theoretical attempts to focus specifically on psychological development: Freud's psychodynamic theory and Piaget's theory of cognitive development.

Structural-Organismic Perspectives

Both Freud and Piaget developed their theories in the early twentieth century when scholars from a number of disciplines wanted to understand how complex systems, such as societies and kin systems, work. To tackle this issue, many of these scholars tried to describe the formal structure, or organization, of the system in which they were interested with the hope that this description could provide insight into how the system worked. Freud and Piaget, who were interested in psychological development, adopted this approach, called *structuralism.* The theories that Freud and Piaget introduced focused on different aspects of development—Freud was interested in emotions and personality, whereas Piaget was interested in thinking. Yet both devised theories that incorporated their mutual interest in biology, especially evolutionary theory, which was prominent at the time. Both Freud and Piaget used what has come to be known as the **structural-organismic perspective** in their theories. They shared the view that the organism goes through an organized or structured series of stages, or discontinuous changes, over the course of development. Both also saw the stages they proposed as universal; that is, all members of the human species were thought to experience these stages regardless of when and where a child develops. Despite these common features, Freud's and Piaget's theories are markedly different from each other.

PSYCHODYNAMIC THEORY   In the early 1900s, Sigmund Freud introduced **psychodynamic theory**, which emphasizes how the experiences of early childhood shape the development of adult personality. This theory is very complex and covers many aspects of psychological functioning. Here we concentrate on the parts of this theory that have influenced developmental psychology.

For Freud, the developing personality consists of three interrelated parts: the id, the ego, and the superego. The roles of these three components of personality change across development as the infant, who is largely under the control of the **id**, or instinctual drives, gradually becomes more controlled by the ego. The **ego** is the rational and reality-bound aspect and attempts to gratify needs through socially appropriate behavior. With further development, the third component of personality, the **superego**, emerges when the child *internalizes*—that is, accepts and absorbs—parental or societal morals, values, and roles and develops a *conscience*, or the ability to apply moral values to her own acts.

To Freud, personality development—that is, changes in the organization and interaction of the id, ego, and superego—involves five stages (see Table 1-1). In the first, the *oral* stage, the young infant is preoccupied with pleasurable activities such as eating, sucking, and biting. In the second to third year, the child enters the *anal* stage and learns to postpone personal gratification, such as the pleasure of expelling feces, as he is trained to use the toilet. Following the anal stage, the *phallic* stage begins, and curiosity about sexual anatomy and sexuality appears. Freud saw this stage as critical to the formation of gender identity. During the *latency* period, from about 6 years of age to puberty, sexual drives are temporarily submerged and children avoid relationships with peers of the other gender. In the last stage, the *genital* period, sexual desires emerge and are directed toward peers, a topic we return to in Chapter 12.

Table 1-1   Freud's and Erikson's developmental stages

Age Period	Stage of Development	
	Freudian	Eriksonian
0-1	**Oral.** Focus on eating and taking things into the mouth	**Infancy.** Task: To develop *basic trust* in oneself and others. Risk: *mistrust* of others and lack of self-confidence
1–3	**Anal.** Emphasis on toilet training; first experience with discipline and authority	**Early Childhood.** Task: To learn self-control and establish *autonomy*. Risk: *shame* and *doubt* about one's own capabilities
3–6	**Phallic.** Increase in sexual urges arouses curiosity and alerts children to gender differences; period is critical to formation of gender identity	**Play Age.** Task: To develop *initiative* in mastering environment. Risk: Feelings of *guilt* over aggressiveness and daring
6–12	**Latency.** Sexual urges repressed; emphasis on education and the beginnings of concern for others	**School Age.** Task: To develop *industry*. Risk: Feelings of *inferiority* over real or imagined failure to master tasks
12–20		**Adolescence.** Task: To achieve a sense of *identity*. Risk: *Role confusion* over who and what individual wants to be
20–30	**Genital.** Altruistic love joins selfish love; need for reproduction of species underlies adoption of adult responsibilities	**Young Adulthood.** Task: To achieve *intimacy* with others. Risk: Shaky identity may lead to avoidance of others and *isolation*
30–65		**Adulthood.** Task: To express oneself through *generativity*. Risk: Inability to create children, ideas, or products may lead to *stagnation*
65+		**Mature Age.** Task: To achieve a sense of *integrity*. Risk: Doubts and unfulfilled desires may lead to *despair*

One of Freud's primary contributions to developmental psychology is his emphasis on how early experiences, especially in the first 6 years of life, influence later development. For him, the way in which the child negotiates the oral, anal, and phallic stages has a profound impact on emotional development and the adult personality. For example, infants who have unsatisfied needs for oral stimulation may be more likely to smoke as adults. Although current developmental theory does not adopt Freud's exact views about early experience, the idea that Freud introduced—namely, that events in infancy and childhood have a formative impact on later development—remains central in the study of child development. Another contribution that Freud's thinking makes to contemporary developmental psychology is the vital role that emotional attachment early in life, especially to the mother, has in socioemotional development, as you will read in Chapter 6. Psychodynamic theory has also been influential in certain areas of applied and clinical psychology, as discussed in Chapter 15.

Freud had many followers who went on to devise their own theories of development, many of which contain concepts that stem from Freud's ideas. Erik Erikson devised the most prominent of these theories in his **psychosocial theory** of human development. In Erikson's theory, development is seen as proceeding through a series of eight stages that unfold across the life span. Each stage is characterized by the personal and social tasks that the individual must accomplish as well as the risks the individual confronts if she fails to proceed through the stages successfully (see Table 1-1). Of these ideas, the most influential for current research in child development is the stage of adolescence, in which the child focuses on identity development and seeks to establish a clear and stable sense of self.
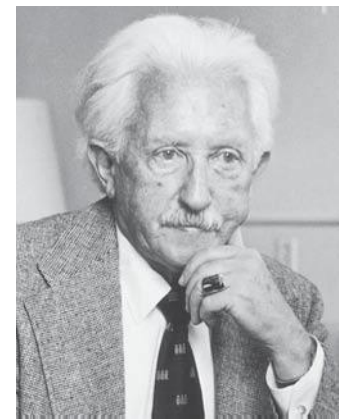
Erik Erikson (1902–1990) studied psychology in Vienna with Freud. His psychosocial theory continues to be influential today, especially for those who hold a life-span perspective on development.

PIAGETIAN THEORY   The Swiss psychologist Jean Piaget introduced a structural-organismic theory to describe intellectual development. The **Piagetian theory** of intellectual development uses two basic principles of biology and biological

change: organization and adaptation. For Piaget, the principle of *organization* reflects the view that human intellectual development is a biologically organized process. Thus, the child's understanding of the world changes in an organized way over the course of development. Piaget used the principle of *adaptation* to describe the process by which intellectual change occurs as the human mind becomes increasingly adapted to the world.

Piaget proposed that all children go through four stages of cognitive development, each characterized by qualitatively different ways of thinking. Whereas infants rely on their sensory and motor abilities to learn about the world, preschool children rely more on mental structures and symbols, especially language. In the school years, children begin to rely more on logic, and in adolescence, children can reason about abstract ideas. According to Piaget, cognitive development is a process in which the child shifts from a focus on the self, immediate sensory experiences, and simple problems to a more complex, multifaceted, and abstract understanding of the world. In Chapter 8, we discuss Piaget's theory in greater detail, including some of the important contributions and main criticisms of this theory.

The theories introduced by Freud and Piaget offer descriptions of development that focus on the structure of the developing system. We now turn to theoretical perspectives that emphasize learning; these approaches highlight process more than structure.

Learning Perspectives

The process of learning is one of the oldest areas of study in psychology. In this section, we explore some of the learning theories that have been applied to developmental issues. We begin with the work of the behaviorists, consider the approaches of the cognitive social learning theorists next, and then explore the information-processing perspective on cognitive development.

BEHAVIORISM   The behaviorist approach to development is exemplified in the work of John B. Watson, Ivan Pavlov, and B. F. Skinner. **Behaviorism** focuses, quite simply, on the learning of behaviors. This approach, when applied to psychological development, emphasizes the role of experience, and it is a gradual, continuous view. The same principles of learning shape development throughout childhood and across the entire life span.

In the early twentieth century, the American psychologist John B. Watson used Pavlov's notion of **classical conditioning**—a type of learning in which two stimuli are repeatedly presented together until individuals learn to respond to the unfamiliar stimulus in the same way they respond to the familiar stimulus—to explain many aspects of children's behavior, such as fear. For example, Watson conditioned an 11-month-old infant to fear furry animals by showing the baby, who was easily frightened by noises, a white rat and simultaneously making a loud noise. B. F. Skinner's notion of **operant conditioning**, a type of learning in which learning depends on the consequences of behavior, was also applied to children's behavior. Positive reinforcement of a particular behavior in the form of praise or a special treat was shown to increase the likelihood that a child would exhibit that behavior again. On the other hand, punishment in the form of criticism or the withdrawal of privileges, such as watching television, can decrease the chance that a child will repeat that same behavior. For instance, Patterson and his colleagues (G. R. Patterson, 1982; G. R. Patterson & Capaldi, 1991) have shown punishment of children's aggressive behavior by "time-out"—a brief period of isolation away from other family members—can help diminish aggressive behavior. Operant conditioning has been incorporated into many applied programs to help teachers and parents change children's behavior, including hyperactivity (restlessness, inattention, impulsivity) and aggression.

behaviorism A learning perspective that holds that theories of psychology must be based on observations of behavior rather than on speculations about motives or unobservable factors.

classical conditioning
A type of learning in which two stimuli are repeatedly presented together until individuals learn to respond to the unfamiliar stimulus in the same way they respond to the familiar stimulus.

operant conditioning
A type of learning that depends on the consequences of behavior; rewards increase the likelihood that a behavior will recur, whereas punishment decreases that likelihood.

A child psychologist at the Universities of Geneva and Lausanne, Switzerland, Jean Piaget (1896–1980) framed a theory of the child's cognitive development that has had great impact on developmentalists, educators, and others concerned with the course and determinants of children's development.

COGNITIVE SOCIAL LEARNING THEORY   According to **cognitive social learning theory**, children learn not only through classical and operant conditioning but also by observing and imitating others (Bandura, 1989, 1997). In his classic studies, Albert Bandura showed that children exposed to the aggressive behavior of another person were likely to imitate that behavior. For example, after a group of nursery school children watched an adult punch a large Bobo doll (an inflated rubber doll that pops back up after being pushed), the children were more likely to attack and play aggressively with the doll than were a group of children who had not seen the model. Neither the adult model nor the children had received any reinforcement, yet the children learned specific behaviors.

Further research on how the process of imitation aids learning has revealed the important contribution of cognition to observational learning. Children do not imitate the behaviors of others blindly or automatically; rather, they select specific behaviors to imitate, and their imitation relies on how they process this information. Four cognitive processes govern how well a child will learn a new behavior by observing another person (Figure 1-2). First, the child must *attend* to a model's behavior. Second, the child must *retain* the observed behaviors in memory. Third, the child must have the capacity, physically and intellectually, to *reproduce* the observed behavior. Fourth, the child must be *motivated*, have a reason to reproduce the behavior.

cognitive social learning theory A learning theory that stresses the importance of observation and imitation in the acquisition of new behaviors, with learning mediated by cognitive processes.

INFORMATION-PROCESSING APPROACHES   **Information-processing approaches** to development focus on the flow of information through the cognitive system, beginning with an input or stimulus and ending with an output or response, much like the way computers process information (Munakata, 2006). In human information processing, output may be in the form of an action, a decision, or simply a memory that is stored for later use. Information-processing theorists are especially interested in the cognitive processes that a child uses to operate on knowledge and the gradual changes over the course of development in children's ability to use these processes. What cognitive processes does the child use? He attends to information, changes it into a mental or cognitive representation, stores it in memory, compares it with other memories, generates various responses, makes a decision about the most appropriate response, and finally, takes some specific action. This approach has been applied to a wide range of topics of cognitive development, including attention, memory, problem solving, and planning. Information-processing theory is also proving valuable in studying how children develop an understanding of reading, mathematics, and science (Siegler, 2000; Siegler & Alibali, 2005) as well as social behaviors, such as social problem solving and aggression (Kupersmidt & Dodge, 2004; Lemerise & Arsenio, 2000). In Chapter 9, we examine this approach more closely in relation to the development of individual thinking and problem solving; and in Chapters 11 and 12, we discuss this approach in relation to social behavior.

information-processing approaches Theories of development that focus on the flow of information through the child's cognitive system and particularly on the specific operations the child performs between input and output phases.

Dynamic Systems Perspectives

Another approach to child development concentrates on changes over time and considers these changes the result of the coordination of elements of a complex, integrated system. Systems theory has been applied to a variety of developmental issues, including motor development, perception, language, cognition, and social behavior. We will encounter many different applications of systems theory throughout the book. *Dynamism* is what makes a system more than just a collection of parts. In **dynamic systems theory**, individuals and their achievements can be understood and interpreted within the framework of the interacting components of the system (Sameroff, 1989; Thelen & Smith, 2006). The term *dynamic* underscores the constant interaction and mutual influence of the elements of the system. (Table 1-2 summarizes some of the principles of the theory.)

dynamic systems theory A theory that proposes that individuals develop and function within systems and that studies the relationships among individuals and systems and the properties by which these relationships operate.

Modeled Behavior

ATTENTION
Experience
Personality characteristics
Relationship with model
Situational variables

RETENTION
Rehearsal
Organization
Recall
Other cognitive skills

REPRODUCTION
Cognitive representation
Concept matching
Use of feedback

MOTIVATION
External incentives
Vicarious incentives
Self-evaluation & incentives
Internalized standards
Social comparison

Matching Behavior
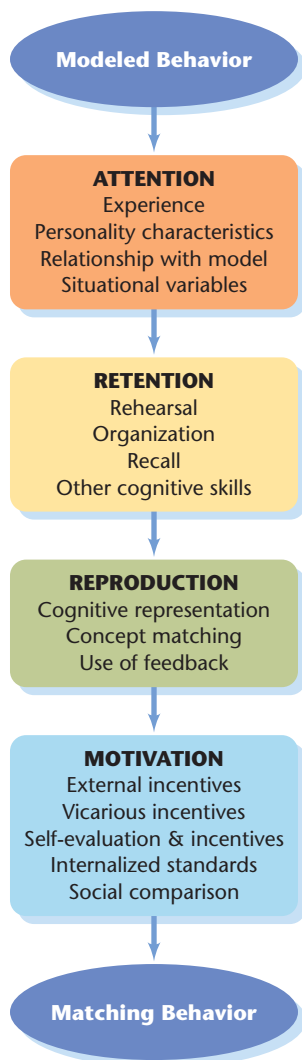
Figure 1-2

Bandura's model of observational learning

To produce a behavior that matches that of a model, a child goes through four sets of processes. Her ability to attend to the modeled behavior is influenced by factors in her own experience and in the situation; her skill in retaining what she has observed reflects a collection of cognitive skills; her reproduction of the behavior depends on other cognitive skills, including the use of feedback from others; and her motivation to produce the behavior is influenced by various incentives, her own standards, and her tendency to compare herself with others.

Source: Based on Bandura, 1989.

Dynamic systems theories are a diverse group that covers a wide range of topics in child development. In some theories, the focus is on the child herself and how the child, as a biological and psychological system, functions and grows in a physical world that both supports and challenges her development. For example, in learning to walk, infants must coordinate many physical abilities, including muscle strength, balance, and momentum, with the features of the physical world such as gravity and the properties of the walking surface. Only when the entire system of forces is coordinated and mastered does the child succeed at walking. Other system theories focus on the child within the nexus of a social system, such as the family or school. Many therapists who adopt a family systems approach contend that they cannot help a child unless the entire family is involved in the therapeutic process. Despite variation in the specifics of different system theories, all attempt to describe how child development arises from the system as a whole, not from any single factor. A child who has muscle strength but lacks balance will not walk, or a child who needs to learn to cooperate more with others at home cannot succeed without the support of other family members.

Contextual Perspectives

Developmentalists and other psychologists know that children as well as adults function in many different settings—such as the home, school, and workplace—as well as in broader contexts, such as communities and societies. In response to this view, some theorists have concentrated on the role of contextual factors in human development. We consider three theoretical perspectives that illustrate contextual approaches to development: (a) sociocultural theory, (b) Bronfenbrenner's ecological theory, and (c) the lifespan perspective.

SOCIOCULTURAL THEORY **Sociocultural theory** places particular emphasis on the impact of social and cultural experience on child development. This approach traces many of its roots to the writings of Lev S. Vygotsky, a Russian psychologist who worked in the early part of the twentieth century. Vygotsky's theory proposes that the child's development is best understood in relation to social and cultural experience. Social interaction, in particular, is seen as a critical force in development. Through the assistance provided by more experienced people in the social environment, the child gradually learns to function intellectually on her own. Thus, the social world mediates individual cognitive development.

By emphasizing the socially mediated nature of cognitive processes, this approach offers new ways of assessing children's cognitive potential and of teaching reading, mathematics, and writing (Brown & Campione, 1997; Hyson et al., 2006). A vivid example in the classroom is peer tutoring, in which an older child helps a younger pupil learn to read, write, add, subtract, and so on.

Sociocultural theory has also increased our appreciation of the profound importance of cultural variation in development. The ways in which adults support and direct child development are influenced by culture, especially the values and practices that organize what and how adults and children think and work together and use cultural tools to understand the world and solve cognitive problems. These tools are devised by cultures and they take a variety of forms, including language, mathematical symbols, literacy, and technology. As children develop, different tools help them function more effectively in solving problems and understanding the world. Thus, tools of thinking, which are products of culture, become incorporated into the ways individuals think about and act in the world. We discuss this theory at greater length in Chapter 8. Throughout the book, many culturally based examples will touch back to this theory.

BRONFENBRENNER'S ECOLOGICAL THEORY **Ecological theory** stresses the importance of understanding not only the relationships between the organ-

Complexity
Each part of a system is unique but at the same time related to one or more of the system's other parts. For example, a family comprises individual members (mother, brother, niece), subsystems (a married couple; their daughter and her husband and children), and extended members (cousins, other more distant relatives, and sometimes even longtime family friends).

Wholeness and Organization
The whole system is organized and contains more than just the sum of its parts. For example, to understand a family system's functioning, we must study not only the characteristics of individual family members and the relationships between them but also the organization of all family relationships and the whole family as an interacting unit.

Identity and Stabilization
No matter how a system may change, the identity of the system remains intact. For example, the family unit continues even when new members join it and old members die. The system's tendency toward stability is maintained over time by the ongoing interactions among individual members and their relationships with one another. The continuing care parents give their children and the relations among group members help to maintain the family as a system.

Morphogenesis
This principle refers to changes in the system. A system must be able to grow and adapt to internal and external changes. Children go to school, leave home, and marry. Parents raise children, change jobs, and retire. Catastrophic change, such as divorce, may force a family system to reorganize itself, perhaps by adapting to a stepparent or to single parenthood. The family must also adapt to changes in social values and institutions such as economic cycles and social ills such as crime and discrimination.

Equifinality
This principle holds that most individuals reach essentially the same developmental milestones, even though, in the process, each one experiences varying combinations of genetic and environmental influences.

ism (e.g., the child) and various environmental systems (e.g., the family and the community) but also the relationships among these environmental systems.

Urie Bronfenbrenner (1979; Bronfenbrenner & Morris, 2006), a major advocate of ecological theory, provides a framework that describes the layers of environmental

Table 1-2

Some principles of dynamic systems theory

Sources: Based on Fogel, 1993; Holt, Fogel, & Wood, 1998; Lewis, 2000; Novak, 1996; Sameroff, 1989, 1994; Thelen, 1995.

sociocultural theory A theory of development, proposed by Lev Vygotsky, that sees development as emerging from children's interactions with more skilled people and the institutions and tools provided by their culture.

ecological theory A theory of development that stresses the importance of understanding not only the relationships between organisms and various environmental systems but also the relations among such systems themselves.

In the world's many cultures, children often begin at an early age to develop specialized skills. In Somalia, a son learns the care and management of camels from his father. In Kotzebue, Alaska, an Inupiat mother guides her daughter in mending fishnets.

microsystem In Bronfen-brenner's ecological theory, the context in which children live and interact with the people and institutions closest to them, such as parents, peers, and school.

mesosystem The interrelations among the components of the *microsystem.*

exosystem The collection of settings, such as a parent's daily work, that impinge on a child's development but in which the child does not play a direct role.

macrosystem The system that surrounds the *microsystem, mesosystem*, and *exosystem*; represents the values, ideologies, and laws of the society or culture.

or contextual systems that impact child development. As Figure 1-3 illustrates, these environmental systems range from the most direct or immediate settings in the child's experience, such as the family or peer group, to more remote contexts of the child's life, such as the society's systems of values and of law. The **microsystem** is the setting in which the child lives and interacts with the people and institutions closest to her. The **mesosystem** comprises the interrelations among the components of the microsystem. Thus, parents interact with teachers and the school system, both family members and peers may maintain relations with a religious institution, and so forth. The **exosystem** is composed of settings that impinge on a child's development but with which the child has largely indirect contact. For example, a parent's work may affect the child's life if it requires the parent to travel a great deal or work late into the night. The **macrosystem** represents the ideological and institutional patterns of a particular culture or subculture. Finally, these four systems change over time, a process that Bronfenbrenner refers to as the **chronosystem**. Over time, both the child and his environment undergo change, and change can originate within the individual (e.g., puberty, severe illness) or in the external world (e.g., the birth of a sibling, parental divorce, or even war). For Bronfenbrenner, development involves the interaction of a changing child with the changing ecological context in all of its complexity.

THE LIFE-SPAN PERSPECTIVE   The **life-span perspective** incorporates historical factors that may influence psychological development (Baltes et al., 2006). This phenomenon is generally referred to as an *age cohort effect*; the term **age cohort**

Figure 1-3

Bronfenbrenner's ecological model of development

Bronfenbrenner emphasizes the importance of the developing child's interactions with the people and institutions closest to her within the *microsystem* and *mesosystem*, as well as the effects on her life of a widening array of social and cultural institutions, attitudes, and beliefs within the *exosystem* and the *macrosystem*. The fact that all of these systems change over time is represented by the *chronosystem*.

Source: From *Child Development in a Social Context* (C. Kopp and J. Krakow, Eds.). Garbarino, J., "Sociocultural risk: Dangers to competence," p. 648. Copyright © 1982 Addison Wesley Publishing Company, Inc. Reprinted by permission of Pearson Education, Inc., Glenview, IL.

BOX 1-1

Risk and Resilience

CHILDREN OF THE GREAT DEPRESSION

What happens to children when economic disaster strikes? To find out, Elder and Shanahan (2006) studied children who, at the time of the Great Depression, were part of an ongoing longitudinal study in California of social and intellectual development. Some of the children were just entering school when the U.S. economy collapsed; others were teenagers.

Dramatic changes in family roles and relationships affected children's development, especially in the more economically deprived families. As fathers' jobs disappeared and family income dropped, mothers entered the labor market. As a result, the mother's power increased, and the power and emotional significance of the father decreased. The rates of divorce, separation, and desertion rose, especially among couples whose relationship was shaky before the onset of the depression (Elder & Shanahan, 2006).

Roles changed for children, too. Girls did more household work, and older boys took more outside jobs. Parent-child relationships also changed; fathers especially became more punitive, less concerned about, and less supportive of their children. Boys tended to move away from the family, becoming more peer-oriented. Both boys and girls were moodier and less calm (Elder & Shanahan, 2006). Because younger children were more dependent on their parents and thus exposed to the altered situation at home for a longer period of time, the effects of the Depression were greater for children who were young when the catastrophe struck.

Many of the effects on children were long lasting. When these children became adults, the boys who were forced to enter the job market as teenagers preferred secure but modest jobs over riskier but higher status positions. Women with childhood difficulties during the Depression often married men who were lacking in ambition; girls who were prone to temper outbursts as children became ill-tempered parents (Elder & Shanahan, 2006). Thus, we see a three-generational impact of the Depression. Economic hardship left its imprint on the lives of many of these families. However, some families managed well in spite of economic hardship, particularly if family ties were strong before the onset of the Depression.

These children, shown on their Missouri farm in 1940, were among the many whose families, whether on farms or in urban tenements and ghettos, were victims of the Great Depression. Although the stock market crash of 1929 triggered an economic collapse that hit its peak by 1933, the U.S. economy did not fully recover until the country began heightened defense spending in 1941, just before entering the Second World War.

means a group of individuals who were born in the same year or during the same general historical period of time. As cohorts develop, they share the same historical experiences. For instance, children born in the United States in the 1950s were teenagers during the turbulent 1960s, and their adolescence occurred against a backdrop of considerable social upheaval.

A striking example of cohort effects is provided in Box 1-1, which describes the experiences of children and adults who lived through the Great Depression of the 1930s. As you can see, historical context has an important influence on the developing child.

chronosystem The time-based dimension that can alter the operation of all other systems in Bronfenbrenner's model, from *microsystem* through *macrosystem*.

Ethological and Evolutionary Approaches

life-span perspective A view of development as a process that continues throughout the life cycle, from infancy through adulthood and old age.

age cohort People born within the same generation.

The final type of approach to studying development has come from the fields of ethology and evolutionary psychology. Since Charles Darwin introduced evolutionary theory, other scientists have sought to understand both the evolution of behavior and its adaptive, or survival, value to the species exhibiting it (Bjorklund & Pelligrini, 2002; Hinde, 1994). Central to this line of thought is the necessity to view and understand behavior in relation to the biology of the organism and the ecosystem in which the organism functions. For example, in attempting to understand children's cognitive skills and behavior, it is important to understand the child's biological nature and needs and the nature of the setting in which behavior takes place, such as a classroom, playground, or library.

ethological theory A theory that holds that behavior must be viewed and understood as occurring in a particular context and as having adaptive or survival value.

ETHOLOGICAL THEORY **Ethological theory**, which was developed by biologists, contends that behavior must be viewed and understood as occurring in a particular context and as having adaptive or survival value. This view has generated interest in the behaviors in human infants and children that are "species specific" (unique to the human species) and that may play an important role in ensuring that others meet children's basic needs, which are critical to survival. Studies have found, for example, that emotional expressions of joy, sadness, disgust, and anger are similar across a wide range of cultures (Ekman et al., 1987; La Freniere, 2000).

Ethologists' basic method of study is the observation of children in their natural surroundings, and their goals are to develop detailed descriptions and classifications of behavior. For developmental psychologists, ethological theory is useful for understanding that many behaviors seen across a range of cultures, such as smiling and crying, may have a biological basis and play an important role in ensuring that caregivers meet children's needs. For example, crying can be viewed as an "elicitor" of parental behavior; it serves to communicate that a child is distressed or hungry. It thus has clear survival value, for it ensures that parents give the young infant the kind of attention she needs for adequate development.

Although human ethologists view many elicitors, such as crying, as biologically based, they also assume that these types of behaviors are modified by environmentally based experiences. For example, children may learn to mask their emotions by smiling even when they are unhappy (La Freniere, 2000; McDowell et al., 2000; Saarni et al., 2006). Thus, modern ethologists view children as open to learning and using input from the environment; they are not solely captives of their biological roots. One of the areas of developmental psychology that has been greatly influenced by ethology is the study of early relationships. In particular, John Bowlby's research on infant-mother attachment, discussed in Chapter 6, stems directly from the perspective offered by ethological theory. And as we will see in Chapter 12, ethologists have also made important contributions to our understanding of how children's groups are organized.

evolutionary psychology An approach that holds that critical components of psychological functioning reflect evolutionary changes and are critical to the survival of the species.

EVOLUTIONARY DEVELOPMENTAL PSYCHOLOGY **Evolutionary psychology** has influenced the study of child development in a somewhat different way from that of ethology. Although ethologists and evolutionary psychologists share many of the same basic assumptions about the origins and social organization of behavior, evolutionary psychologists have had a major impact on the study of cognition and cognitive development. This perspective holds that the critical components of human evolutionary change are in the areas of brain changes and cognitive functioning (Cosmides & Tooby, 1987). This approach is influential in child development in that it directs attention to the types of capabilities and constraints of the cognitive system that enable humans to understand and act on the world in the ways that support their survival. In developmental terms, the main questions stemming from this view hover around when and how these cognitive capabilities emerge (Bjorklund & Pelligrini, 2002).

Table 1-3   Overview of developmental themes and theoretical perspectives

Perspectives	THEMES		
	Biology vs. Environment	**Continuity vs. Discontinuity**	**Individual Characteristics vs. Contextual and Cultural Influences**
Structural-Organismic Perspectives			
Freudian theory	Interaction between biology and environment	Discontinuity (stages of development)	High on individual traits
Erikson's theory	Interaction between biology and environment	Discontinuity (stages of development)	High on individual traits
Piagetian theory	Interaction between biology and environment	Discontinuity (stages of development)	Emphasis on individual characteristics
Learning Perspectives			
Behaviorism	Environment	Continuity (no stages)	High on situational influences
Cognitive social learning theory	Environment	Continuity (no stages)	High on situational influences
Information-processing approaches	Focus on environment but recognition of biology	Continuity (no stages)	High on situational influences although individual characteristics important
Dynamic Systems Perspectives			
	Interactions among all systems—biological, psychosocial, environmental	Continuity (no stages)	High on situational influences
Contextual Perspectives			
Vygotsky's sociocultural theory	Interaction between biology and environment	Discontinuous for some aspects of development	Situation and context are important
Bronfenbrenner's ecological theory	Focus on environment but recognition of biology	Continuity (no stages)	High on situational influences
Ethological and evolutionary approaches	Emphasis on biology, but environment plays role in eliciting and modifying behavior patterns	Varies among individual theories (e.g., depends on theory's view of critical periods)	High on situational influences
Historical and life-span perspectives	Focus on environment but recognition of biology	Continuity (no stages)	High on situational influences

Although the focus in evolutionary perspectives is largely on cognitive processes and their development, these processes are seen as instrumental to human functioning more broadly (Bugental & Grusec, 2006). Different contexts of development present humans with different problems to solve. For example, a child who lives on a remote island has many different types of experiences and problems to solve in his everyday activities compared with a child who lives in an urban, industrial center. One feature of human cognition, which is a product of evolution, is the adaptation of our intelligence to the types of problems that are important to solve in the environment we inhabit. Also of interest are the capabilities that human children develop that enable them to learn from their interactions with other people. For instance, Tomasello (1999) considers development of the ability to understand others' intentions a central feature of human cognitive development. Through understanding that other people have mental states and intentions behind actions, children are able to learn meaningful, goal-directed behaviors by watching and interacting with others. Therefore, the behaviors children observe and learn are not just mindlessly imitated; they contain the meaning or intention of the human action.

Making the Connections 1-1

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 1's discussion of developmental themes and theories and discussions in other chapters of this book.

Chapter 1
Child Development: Themes, Theories, and Methods

Intergenerational transmission of risk.
In Chapter 3, "Prenatal Development and Birth," pp. 85–86

Children learn language by interacting with other people in their social context.
In Chapter 7, "Language and Communication," pp. 239–241

TV roles influence gender typing as children learn about female and male social roles and stereotypes.
In Chapter 13, "Gender Roles and Gender Differences," pp. 495–496

Altruism and prosocial behavior have evolutionary roots, and it is adaptive for children to share, just as it is for many animal species.
In Chapter 14, "Morality, Altruism, and Aggression," p. 525

THEMES AND THEORIES: A FINAL COMMENT

As we stress throughout this book, the understanding of children's development can be approached from many perspectives. Table 1-3 summarizes the theories we have discussed in relation to the themes of development, specifically their views on the biological versus environmental influences on development, the continuous versus discontinuous nature of developmental change, and their emphasis on individual versus contextual influences. You can see from even these brief descriptions that these theories have some differing positions on these three themes. Although the presence of different theories adds a layer of complexity to studying child development, many questions about development benefit from these different theoretical perspectives. Different theories can often point to different aspects of a developmental process. Also, it is increasingly clear that different aspects of development, such as language and emotional and social behavior, are interlinked. For example, children's learning takes place in social contexts, and the experiences and relationships children have with other people affect what and how they learn from them. To understand such complex processes, several theoretical points of view are needed. In addition, interest in explaining complex processes of development leads to a greater acceptance of systems and contextual approaches to development. Ethological and evolutionary approaches add species-specific capabilities and needs to these views. Many developmental psychologists today draw on some of the assumptions of these approaches. In addition, it seems that several theories can tell us a great deal more about the causes and course of children's development than any single one alone can. Now we turn to research methods—that is, how developmental psychologists test the ideas that stem from these various theories of child development. Although the theoretical perspectives we discussed are not wedded to particular methods, theories do tend to favor some methods over others. We will point out these theory and method links in our discussion.

RESEARCH METHODS IN CHILD PSYCHOLOGY

Like other scientists, child psychologists use the **scientific method** in their research; that is, they formulate hypotheses on the basis of a theory and use measurable and replicable techniques to collect, study, and analyze data in an effort to test the theory's usefulness. The main issues in a scientific approach to psychological development include selecting a sample, designing a study that taps development in some way, and ensuring that all ethical protections are in place.

scientific method The use of measurable and replicable techniques in framing hypotheses and collecting and analyzing data to test a theory's usefulness.

Selecting a Sample

If you wanted to study the typical play activities of preschoolers, how would you go about collecting your data? How many children do you suppose there are at a given time in the United States? Rather a lot. You couldn't possibly study all of them, but you could select a **sample**, or a group of manageable size made up of individuals who, you hope, are representative of the entire population of preschoolers that you want to describe.

sample A group of individuals who are representative of a larger population.

REPRESENTATIVENESS OF A SAMPLE   If we want our research conclusions to be applicable to the population our sample is designed to reflect, we must ensure the **representativeness** of that sample. That is, the persons we choose to study must possess nearly the same characteristics evidenced by the larger population in which we are interested. Also, depending on that population, we may need a very broad sample in which many cultures, social classes, or ethnic backgrounds are represented. Consider the following example:

representativeness The degree to which a sample actually possesses the characteristics of the larger population it represents.

> A researcher wants to study the way children's vocabularies change over time. Living near a private nursery school in an affluent suburban community, she selects thirty 3-year-olds and thirty 5-year-olds from the school population and tests their vocabulary levels. Based on the performance of these children, the investigator reports that she has a set of norms or guidelines for what may be expected of preschoolers' vocabulary knowledge. What's wrong with the researcher's conclusion?

The investigator has chosen her sample poorly because, other things being equal, the parents of these children are likely to be well educated and to have verbal skills that surpass those of less educated parents. It's also possible that experiences at the school, where the ratio of teachers to students may be more favorable than in public schools, facilitate children's learning. Clearly, we can't generalize about the average vocabulary accomplishment of all children of ages 3 and 5 unless we sample a range of children from different backgrounds and in different instructional settings.

This simple example illustrates one of the major problems that a researcher faces in selecting a sample—namely, to try to recruit a group of people representative of the larger population about which the researcher wishes to hypothesize. Of particular concern is obtaining a sample that represents the diverse population of nations such as the United States. Despite the fact that the portion of the U.S. population that is not of European ancestry is expected to reach 18% by the year 2020 (U.S. Department of Commerce, 2004) and that about 50% of the U.S. population is either working class or poor, much developmental research ignores non-European, non-middle-class children and families (Fisher, Jackson, & Villaruel, 1998).

ANOTHER APPROACH: THE NATIONAL SURVEY   In an innovative approach to sampling called the **national survey**, researchers interested in a particular issue or issues select a very large, nationally representative group of people. For example, the National Longitudinal Survey of Youth (NLSY), begun in 1979 with

national survey A method of sampling in which a very large, nationally representative group of people are selected for a particular study.

Source: PEANUTS reprinted by permission of United Feature Syndicate, Inc.

a sample of young men and women who then ranged in age from 14 to 24, has interviewed its participants annually on such topics as experiences in the family, school, and work. The survey participants were drawn from 235 geographic areas across the United States. This broad sampling strategy has the advantage of allowing researchers to make general statements that may be applied to all Americans in the same age groups, and it has been used to investigate such issues as the impact of maternal employment and neighborhood quality on children and families (Brooks-Gunn, Berlin, Leventhal, & Fuligni, 2000; Brooks-Gunn, Smith, Berlin, & Lee, 2001). Its major disadvantage, however, is that national surveys are costly in terms of time and labor.

Although the NLSY and other similar large-scale studies can reveal overarching patterns in people's behavior and relationships among particular factors, these studies are less suited to answering specific questions about the processes that may account for particular aspects of development. For this reason, a national survey is sometimes used in combination with a more intensive look at a smaller sample of people.

Methods of Gathering Data About Children

Once researchers have decided what group or groups they want to study, they must decide how they will study these youngsters. Essentially, there are three methods of gathering such data: We can ask children about themselves, we can ask people who are close to these children about them, or we can observe the children directly. Each approach has its advantages and limitations, and the researchers' choices depend on the kinds of questions they want to answer.

self-report Information that people provide about themselves, either in a direct interview or in some written form, such as a questionnaire.

CHILDREN'S SELF-REPORTS   A **self-report** is information that a person provides about himself or herself, typically by answering a set of questions devised by a researcher. Soliciting such information from a child, as you may imagine, presents special problems. Compared with adults, children—especially younger ones—are apt to be less attentive, slower to respond, and to have more trouble understanding the questions that researchers ask. Despite these limitations on children's self-reports, some kinds of information, such as how a child feels about an experience or another person, are difficult to obtain in any other way (Cummings et al., 2000).

REPORTS BY FAMILY MEMBERS, TEACHERS, AND PEERS   A second way of collecting data on child development is to solicit information from people who know a child or children well. Most commonly, child development researchers seek this information from family members, teachers, and peers.

A strength of interviews with parents and other family members is that these reports are generally based on many observations made over time in a variety of situations. Another advantage of reports by family members is that even if parents and siblings are

not totally accurate in their reporting, their perceptions, expectations, beliefs, and inter-pretations of events and behavior may be just as important as what we can only assume is objective reality (Bugental & Grusec, 2006; Collins & Repinski, 2001). For example, whether or not a child's parents explicitly insist on exceptionally good academic perfor-mance, a child's belief that her parents want her to do very well in school may greatly influence her behavior. There are some clear disadvantages in soliciting parental and other family reports about a child's growth and development. Human memory is not completely reliable. Also, because people are motivated to remember themselves in the best light possible, parents often remember themselves as more consistent, patient, and even tempered with their children than more objective assessments might have revealed them to be.

In an effort to increase the accuracy of parents' reports about their children, inves-tigators have devised a number of interview strategies. For example, they may have parents report only very recent events so as to ensure more reliable memories, they may phone parents every evening and ask which of a list of specific behaviors (e.g., crying or refusing to comply) their children have exhibited in the past 24 hours (Patterson, 1996; Patterson & Bank, 1989), or they may ask parents to keep a structured diary in which they record the child's behaviors at regular intervals (e.g., every hour; Hetherington, 1991a). Child development researchers have even asked parents to carry pagers, which experimenters then beep randomly, asking the parents to record their activities or feel-ings or those of their children (Larson & Richards, 1994). This approach allows for a random sampling not only of behaviors but also of the situations in which these behav-iors occur.

To learn about a child's behavior in school and other settings when parents aren't present, researchers can ask other people, such as teachers and peers. Investigators may ask teachers to rate children on a specific series of dimensions such as attentiveness, dependability, and sociability in the classroom or on the playground. One technique researchers often use is to ask children, such as classmates, to rate how well a particular child's peers accept him. For example, investigators might ask all the youngsters in a classroom to rate each of their peers in terms of "how much I like to play with" him or her. The researchers then combine all the ratings to yield a picture of each child's social status in the classroom (Ladd, 2005; Rubin et al., 2006).

Although children's self-reports, parental reports, and reports by others have their limitations, researchers have found that these reports offer them the best understanding of many issues. In addition, as we will see next, these kinds of reports are often used in conjunction with other data-gathering strategies.

DIRECT OBSERVATION   There is often no substitute for researchers' own **direct observation** of people, and students of child development may make such obser-vations in naturalistic settings, such as participants' own homes, or in laboratories where they give children and sometimes parents a structured task to perform. Observational data are valuable resources in examining human behavior. However, such data are valid only to the extent that the presence of an observer or other demands of the situation do not distort the participants' behavior and responses.

These distorting factors are sometimes hard to avoid because children and par-ents often behave differently in different kinds of settings or when they know they are being watched. Both adults and children tend to express less negative emotion and to exhibit more socially desirable behavior when observations are conducted in unfa-miliar settings, such as a laboratory, compared with at home (Lamb et al., 1979). Even in home observations, customary behavior can be distorted by the presence of an out-side observer. Parents, for instance, tend to inhibit negative behavior when they are watched (Russell et al., 1991). Attempts to minimize such distortions in studies in peo-ple's homes include the use of less obtrusive observational methods, such as camera or sound recordings without the observer present, and by conducting many regular visits from an observer—for example, an observer being at a family's home each dinner hour

direct observation A method of observation in which researchers go into settings in the natural world or bring participants into the laboratory to observe behav-iors of interest.

Research with very young children, like this 6-month-old infant, is becoming increasingly common as psychologists seek to expand our knowledge about early development. A video or digital recording will permit closer study of this child's behavior after the observation session is over.

structured observation A form of observation in which researchers structure a situation so that behaviors they wish to study are more likely to occur.

over a period of several weeks (Feiring & Lewis, 1987). As surprising as it may seem, people can get used to such observational techniques; as observations proceed, one sees gradual increases in less socially accepted behaviors, such as quarreling, criticizing, and punishing (Boyum & Parke, 1995).

When researchers decide to observe children and their families directly, they must decide what kinds of behaviors to record (Bakeman & Gottman, 1997), such as how detailed the observations will be or how frequently they will be recorded. When a child development specialist is interested in a specific behavior, he may arrange a situation to observe the behavior using a method called **structured observation**. Suppose a researcher is interested in the way mothers instruct their children about how to solve problems. The researcher may invite mothers and children to the laboratory to participate in a joint problem-solving session, perhaps one that involves putting together different types of puzzles, and observe how their interaction changes as the child attains skill and understanding of the task.

The potential usefulness of child self-reports, reports by others, and observational methods to provide insights into many aspects of child development is great. However, because of the limitations inherent in all these methods of gathering data, many investigators use several methods in the same study; for example, they combine observations with parent surveys or interviews. If the findings of a variety of methods converge, researchers can reasonably conclude that the findings are valid.

Research Design: Establishing Patterns and Causes

Selecting a sample and a method of gathering information enables us to describe some aspect of human development, but what will this information do for us? To make use of it, we need to design a study to determine how the various factors of development that we have described are related to and interact with each other, with the goal of

identifying the reasons that development occurs as it does. In this section, we offer a brief discussion of the most common research designs—the correlational method, the experimental method, and the case study—that are used by psychologists to study the nature and process of child development. In describing these methods, we have chosen illustrations that pertain to a single topic: the effect on children's behavior of viewing violent television programs. Our aim is to show how different designs yield different approaches and answers to this question.

THE CORRELATIONAL METHOD   Many questions in child development reflect an interest in whether some experiences of childhood are related to other experiences of childhood in a regular or systematic way. For example, how do educational television programs such as *Sesame Street* relate to better performance when children enter school? To illustrate the **correlational method** of research, a design that enables researchers to establish that certain experiences or factors are related to each other and to assess the strength of the relations, let's examine a study that addressed this question. John Wright and Aletha Huston (1995) studied the TV-viewing behavior of preschool children in more than 250 families, all from low-income areas. The children were either 2 or 4 years old at the start of the study and either 5 or 7 at its conclusion. The parents were asked to make detailed reports on how their preschoolers spent their time, including which TV shows they watched and for how long each day, and every year, the children were given a variety of cognitive achievement tests, such as measures of mathematical skill and word knowledge. The researchers found that the more educational programs the children watched, the higher they scored on the tests (Figure 1-4).

Thus, these factors were positively correlated with each other in that scores for both measures increased. Children who viewed more educational TV shows did better on the academic tests. However, the researchers also found that the more time children spent watching cartoons or adult programs, the lower they scored on these tests, which is a negative correlation; that is, as one score increased the other score decreased.

The critical point to remember about correlational research is that a correlation does not indicate causal relations between factors; it simply tells us that two factors are related to each other and indicates the strength or magnitude of that relation. Thus, the correlations found by Wright and Huston do not indicate that watching educational programs caused higher test scores. Any number of factors other than watching educational shows could have improved the children's test scores. For example, suppose

correlational method A research design that permits investigators to establish relations among variables as well as assess the strength of those relations.
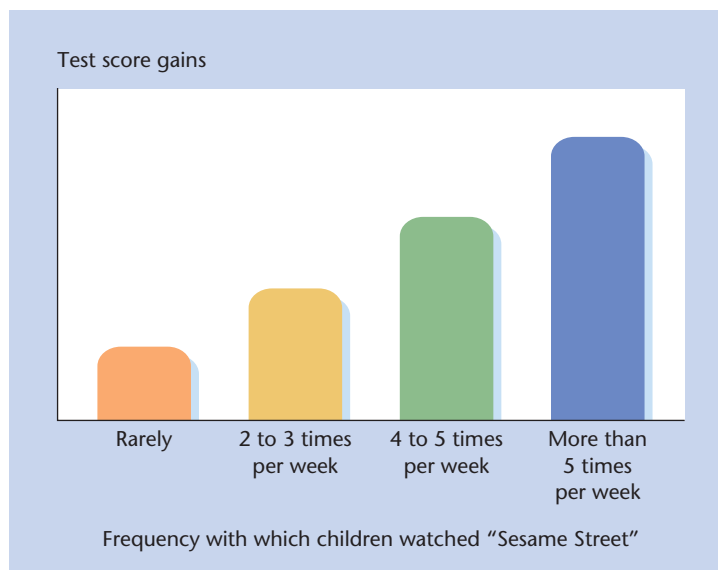
Figure 1-4

Watching *Sesame Street* makes scores rise

In one of the first studies of the effects of watching *Sesame Street*, researchers found that on tests of identification of body parts; recognition of letters, numbers, and geometric forms; and classifying and sorting, preschoolers who frequently watched the show performed significantly better than those who watched rarely.

Test score gains

Rarely | 2 to 3 times per week | 4 to 5 times per week | More than 5 times per week

Frequency with which children watched "Sesame Street"

that children whose parents give them a great deal of encouragement and guidance in academic subjects are the same ones who watch the educational programs.

If correlational research doesn't allow us to determine causation, why do we use it? For one thing, many questions are difficult to study in a controlled laboratory design. For example, the effect of viewing educational programs on cognitive development is cumulative, meaning it happens over a long period of time. An experiment to study such long-term exposure would be difficult to design. Also, understanding causal processes is not the goal of all developmental research. Many investigators are primarily interested in describing the patterns and paths of development as it naturally occurs, which is what the correlational method describes.

EXPERIMENTAL DESIGNS   The primary way researchers investigate causal connections among factors is with an experiment. An experiment can be carried out in a laboratory, in the field, or in natural situations. In a **laboratory experiment**, researchers are able to control factors that may influence the variable they are interested in, and therefore, their results allow them to draw conclusions about cause and effect. Researchers will control or hold constant, or equate, every possible influence except the one factor they have hypothesized to be the cause of the variable they want to study. They then create two groups of participants. One group, called the **experimental group**, is exposed to the proposed causative factor; the second group, the **control group**, does not experience this factor. Researchers put people in these two groups by using **random assignment**, which will rule out the possibility that the people in each of the groups differ from one another in some systematic way that could distort the results of the experiment (e.g., more skilled people in the experimental group).

To understand how these various controls enable the laboratory experimenter to determine causality, let's look at a classic study of the relation between watching violent television programs and aggressive behavior. Liebert and Baron (1972) randomly assigned 136 boys and girls ranging in age from 5 to 9 to either an experimental group or a control group. The children in both groups first saw two brief commercials selected for their humor and attention-getting value. Then half the children—those in the experimental group—saw 3.5 minutes of a TV program about crime that contained a chase, two fistfights, two shootings, and a knifing. In contrast, the children in the control group watched a highly active but nonviolent sports sequence of the same time length. Finally, the children in both groups watched another 60 seconds of a tire commercial. The only difference between the two groups was the 3.5-minute video they watched—that is, exposure or no exposure to violent TV episodes. This is the **independent variable**, or the factor the researchers deliberately manipulate. The researchers thus hypothesized that if the children in the experimental group later behaved differently from those in the control group, it would be reasonable to conclude that exposure to TV violence was the cause.

In the second phase of the study, the experimenters told each of the children that they were to play a game with another child in an adjoining room (whom they could not see and who, in fact, was purely imaginary). The researchers seated each child before a panel that had two buttons labeled "Hurt" and "Help" and told the child that the buttons were connected to a handle in the other room that their play partner would use. The experimenter explained that if the child wanted to make it easier for her "play partner" to turn the handle, she could press the Help button. But if the child wanted to hinder her "play partner," she could press the Hurt button, which would turn the handle burning hot. Of course, this entire scenario was a deception, and nothing a child did hurt anyone else. (The issue of deception raises ethical questions that we discuss shortly.) The amount of aggressiveness the children display is the **dependent variable**, or the factor that researchers expect to change due to the independent variable. The researchers believed that by measuring how long and how often children depressed the Hurt button, they could find out how aggressively children in the experimental and the control groups would behave toward another child. Liebert and Baron discovered the causal relation they predicted. Children who had seen the violent TV segment were more will-

laboratory experiment A research design that allows investigators to determine cause and effect by controlling variables and treatments and assigning participants randomly to treatments.

experimental group In an experiment, the group that is exposed to the treatment, or the *independent variable.*

control group In an experiment, the group that is not exposed to the treatment, or the *independent variable.*

random assignment The technique by which researchers assign individuals randomly to either an *experimental or* control *group.*

independent variable The variable, or factor, that researchers deliberately manipulate in an experiment.

dependent variable The variable, or factor, that researchers expect to change as a function of change in the independent variable.

ing to harm or behave aggressively toward their "play partner" than were children who had watched the nonviolent sports program.

Although this study was carefully designed, it has limitations that may prevent generalization from the experimental situation to the natural world. Ensuring a study's **ecological validity**, or its accurate representation of events and processes that occur in the natural environment, is often difficult. For example, Liebert and Baron edited their violent TV program to include more acts of violence in 3.5 minutes than would normally occur in a randomly chosen TV segment of this length, even in a show that has a lot of violence. Despite these limitations, experimenters can gain important insights about human behavior from laboratory experiments. For instance, finding out the softest ranges of sound a child can hear requires controlling all outside noise, which is rare if not impossible in everyday experience. When scientists want to use an experiment yet study behavior in a more ecologically valid way, they conduct experiments in the field.

In a **field experiment**, investigators deliberately introduce a change, called a manipulation, in a person's normal environment and then measure the outcome of their manipulation. As an illustration, let's consider a field experiment about the impact of viewing TV violence on aggressive behavior in children (Friedrich & Stein, 1973). Preschoolers enrolled in a summer program were the participants in this study. During the first 3 weeks of the study, the researchers observed the children during their usual play sessions to determine how much aggressive behavior each child displayed under normal circumstances. This is called a baseline measure. Then, for the next 4 weeks, they showed the children, who were randomly assigned to one of three groups, a half-hour TV program each day. Some children always saw programs depicting interpersonal aggression, such as *Batman* and *Superman* cartoons; others saw programs with a message of caring and kindness toward others, such as *Mister Rogers' Neighborhood*; and others watched neutral shows, such as nature programs.

The researchers found that children who had been rated high in aggressive behavior before the TV-watching manipulation behaved even more aggressively after repeated exposure to aggressive cartoons but not after exposure to the other two kinds of shows. For children who were rated low in aggression during the initial assessment period, watching aggressive TV shows had no effect; they were still less likely to behave aggressively. Children who watched neutral shows did not change either. The researchers concluded that exposure to TV violence can increase aggression in children but only among children already likely to behave aggressively. These findings were especially interesting in that the researchers took care to minimize **observer bias**—that is, the tendency of observers who are knowledgeable about a hypothesis to be influenced in their observations by that knowledge. The observers who assessed the children's behavior after the TV viewings did not know which types of programs the different children had seen.

One advantage of the field experiment over the laboratory experiment is that the results can be generalized more readily to real-life experiences. Friedrich and Stein did not edit the TV programs the children saw in any way, and these programs were among those that many of the children watched in their homes. Moreover, the children's aggressive behavior was measured in an everyday setting, not in a situation that allowed or encouraged them to behave aggressively. At the same time, the field experiment retains some important features of a laboratory experiment. Because the independent variable—the type of TV program—was under the control of the researchers, and the participants were randomly assigned to the various groups, Friedrich and Stein could be reasonably confident that they had demonstrated a causal connection—namely, that exposure to TV violence may encourage aggressive children to behave even more aggressively.

There is yet another type of experiment that developmental psychologists use that you will see discussed in the text. For ethical or practical reasons, researchers may not be able to introduce changes into the natural world. In these instances, they may conduct a **natural experiment**, in which they measure the effects of events or changes that occur

ecological validity The degree to which a research study accurately represents events or processes that occur in the natural world.

field experiment An experiment in which researchers deliberately create a change in a real-world setting and then measure the outcome of their manipulation.

observer bias The tendency of observers to be influenced in their judgments by their knowledge of the hypotheses guiding the research.

natural experiment An experiment in which researchers measure the results of events that occur naturally in the real world.

HOW CAN WE MAKE BETTER USE OF RESEARCH ON CHILDREN AND TELEVISION AND INTERNET USE?

The impact on children of the amazing growth of communications media cannot be denied. From early radio, movies, and comic books to television and its electronic cousins—videotapes, video games, CD-ROMs, and the Internet—children have been bombarded with new information and experiences via the media.

What has the wealth of research on children and television revealed? It has shown that some television programs do help young children learn, but it has also shown negative effects on children of watching programs filled with violence and sex as well as commercials that prey on the young child's limited understanding (Comstock & Scharrer, 2006). Research on children's and adolescents' use of the Internet has also revealed some positive effects, such as improved reading scores (Jackson et al., 2006), and some negative effects, such as increasing adolescents' awareness of dangerous behaviors such as various forms of self-injury (Whitlock et al., 2006).

Although the U.S. Congress and the Federal Communications Commission have passed laws intended to influence commercial media, these laws have often failed to impose specific directives, such as banning certain content, mandating certain types of programs, or setting limits as to the period of time (e.g., early evening) or amount of time allotted to child-

oriented programming. Moreover, the laws that have imposed such directives have often not been enforced. Attempts to legislate television programming run the risk of violating First Amendment rights to freedom of expression. Another barrier to the regulation of media content is economic in nature. The television industry is economically robust and maintains a powerful lobby in the nation's capital (Wartella, 1995).

If certain media exposure is unsuitable for children or adolescents, what can parents and others do beyond seeking stricter laws and government policies? Huston and Wright (1998) stress that parents need to recognize and act on their own enormous influence on children's use of media. Setting an example, coviewing programs, navigating Internet sites with their children, and setting household limits are time-honored prescriptions.

Research has also shown that parents can help children understand the content and utility of such information sources as well as help them cope with fears aroused by specific content (Wilson & Weiss, 1993). Clearly, media exposure is a family affair, and families as well as those who produce media and the government need to share responsibility for this ever-increasing aspect of children's lives.

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naturally in the real world. Unlike a laboratory or field experiment, the research participants are not randomly assigned to experimental conditions. Instead, the researchers select the children they study because the children are already exposed to a set of conditions that are of interest to the researcher, such as enrollment in day care or a nutritional supplement program. One example of a natural experiment is a study that investigated the way the introduction of television into a community affected aggressive behavior among children (MacBeth, 1996). By monitoring the level of aggressiveness in children's play both before and after the debut of television in a small town in Canada, the investigator was able to show that aggressive behavior did in fact increase after TV arrived in town. As our examples suggest, a great deal of research has been devoted to children's television viewing and, more recently, Internet use. Box 1-2 discusses this research and its impact on legislation.

THE CASE STUDY APPROACH   Can we learn anything about development by studying a single child or perhaps a single group, such as a particular classroom? The study of individual persons or a group, called the **case study method**, is sometimes used in developmental research. The case study allows investigators to explore phenomena that they do not often encounter, such as an unusual talent, a rare developmental disorder, or a model classroom. In the 1800s, in one of the first recorded case studies,

case study method A form of research in which investigators study an individual person or group very intensely.

Design	Control over Independent Variable	Control over Dependent Variable	Generalizability of Findings
Correlational method	Low	Low	Medium
Laboratory experiment	High	High	Low
Field experiment	Medium	Low	High
Natural experiment	Low	Low	High

Table 1-4

Research designs: Advantages and limitations

Charles Darwin (1872) kept a highly detailed diary of his infant son's emotional expressions, a record that became the basis for his theory of emotional development in infants and children.

Sometimes, a case study provides insights or hypotheses that later investigations pursue in a more systematic fashion. For example, careful observation of one child who experiences a new treatment for child conduct problems may shed light on how the treatment works for children with certain behavioral patterns. However, the chief limitation of the single-case approach is that without further study or a larger sample, it is difficult to know if the results of the case study generalize from one individual to other people or situations.

COMBINATION DESIGNS IN DEVELOPMENTAL RESEARCH

The research method that a developmental scientist uses depends on the question being asked and the ages of the children studied. (Table 1-4 summarizes the differences among the research designs we've examined so far.) Researchers may also combine these designs over a series of studies on the same topic. For example, a researcher may start off in an unexplored area by using a correlational approach to establish some possible relations among the factors studied. Then she may use an experimental approach to achieve a clearer view of the causal links among these factors. Finally, she may examine closely a single-case study, either of an individual or a group, to provide more details about the process under study. In the field of child development, the use of multiple methods is becoming increasingly common.

Studying Change Over Time

Recall that the main focus of research in child development is change over time. To study developmental change, the field makes use of certain methods intended to measure this type of change. The main research methods used to study time are the cross-sectional, longitudinal, and sequential methods.

THE CROSS-SECTIONAL METHOD The most common strategy for investigating age-related differences in development is the **cross-sectional method**, in which researchers compare different individuals of different ages at the same point in time. Cross-sectional research compares different age groups of children on a topic, such as a behavior or cognitive performance, to determine how changes associated with age may unfold over the course of development.

Consider the cross-sectional research done by Rheingold and Eckerman (1970) on developmental changes in children's independence from mother. These researchers observed mothers and their children, with the children representing nine different ages between 12 and 60 months. There were six children (three boys and three girls) at each of the 6-month intervals between 12 and 60 months of age; for example, six children were 12 months old, six children were 18 months old, and so on. The researchers observed the children's behaviors in a controlled outdoor setting. They positioned the mothers and children at one end of a large lawn; the mothers sat in chairs, and the children were free to roam. Observers were stationed nearby, and they recorded the paths the children took. A positive correlation between child age and distance traveled

cross-sectional method A research method in which researchers compare groups of individuals of different age levels at approximately the same point in time.

from mother was found. The average farthest distance from mothers for 1-year-olds, the youngest age group, was about 23 feet (6.9 meters); by 2 years of age, children ventured about 50 feet (15.1 meters); 3-year-olds went 57 feet (17.3 meters); and 4-year-olds went 68 feet (20.6 meters).

Using the cross-sectional method, the researchers were able to determine how independence differs across age levels. However, this approach yields no information about the causes that lie behind these age-related changes because we cannot know what the children in the study were like at younger ages. For example, we do not know if the child who is very independent at 1 year is likely to be more independent at age 5 than a peer who exhibited little independence when he was 1 year old. Another research design, the longitudinal method, is better suited to tackling the issue of individual change over time.

THE LONGITUDINAL METHOD   The Fels Longitudinal Study began in 1929 and continued until the 1970s. It followed the same groups of children from birth to age 18. Parents who enrolled their newborns in this study agreed to have the child weighed, measured, observed, and tested until he or she was old enough to graduate from high school. One conclusion of this study, which could only be obtained by studying the same children over time, was that certain behaviors are stable over time and that in some cases the stability of a behavior was affected by the child's gender. For instance, boys were more likely to show stable patterns of aggressive behavior from childhood to adulthood (Kagan & Moss, 1962; see also Chapter 13).

longitudinal method A method in which investigators study the same people repeatedly at various times in the participants' lives.

This type of research uses the **longitudinal method**, in which researchers study the same individuals repeatedly at various points in their lives to assess patterns of stability and change over time. A longitudinal design allows researchers to follow the development of individuals, and as a result, it can explore possible causes of any observed pattern. It is a powerful method for evaluating the impact of earlier events on later behavior.

But the longitudinal method also has disadvantages. It takes years to collect longitudinal data, and researchers often want to obtain information more quickly. In addition, there is the problem of losing participants. Over time, people move, become ill, or simply lose interest and no longer participate in the study. In addition, the questions and concerns that inspired the research may not be of interest later in the study. Another problem arises from what we call *practice effects*, or the effects of repeated testing. Since the same measures may be used in several successive years, participants' answers may be the result of their familiarity with the items or questions.

A way to avoid some of these problems is to conduct a short-term longitudinal study. Here researchers track the same group of people but for a limited time period, usually a few months or a few years. Their focus is usually limited to a few key questions, often questions that this relatively brief time period can address adequately. For instance, Roger Brown and his colleagues (Brown, 1973) tracked the language development of three children, Adam, Eve, and Sarah, for a period of 5 years. Such research has the advantage of shortening the period of data collection and thereby avoiding dropouts in the sample.

A different kind of drawback to lengthy longitudinal studies is the problem of generalizing to generations other than the one studied. Children today grow up with many experiences unknown to children growing up in their parents' or grandparents' generations—for example, computers or the widespread use of day care. Findings from a longitudinal study may lose relevance as society changes and be descriptive of only a particular age cohort—that is, members of the same generation.

sequential method A research method that combines features of both the *cross-sectional* and the *longitudinal methods*.

THE SEQUENTIAL METHOD   A creative way around the problem of separating age-related changes from changes caused by the unique experiences of a particular age cohort is to use the **sequential method**, which combines features of both cross-sectional and longitudinal studies. In this method, researchers begin by selecting samples of children of different ages, as they would in cross-sectional research. Sup-
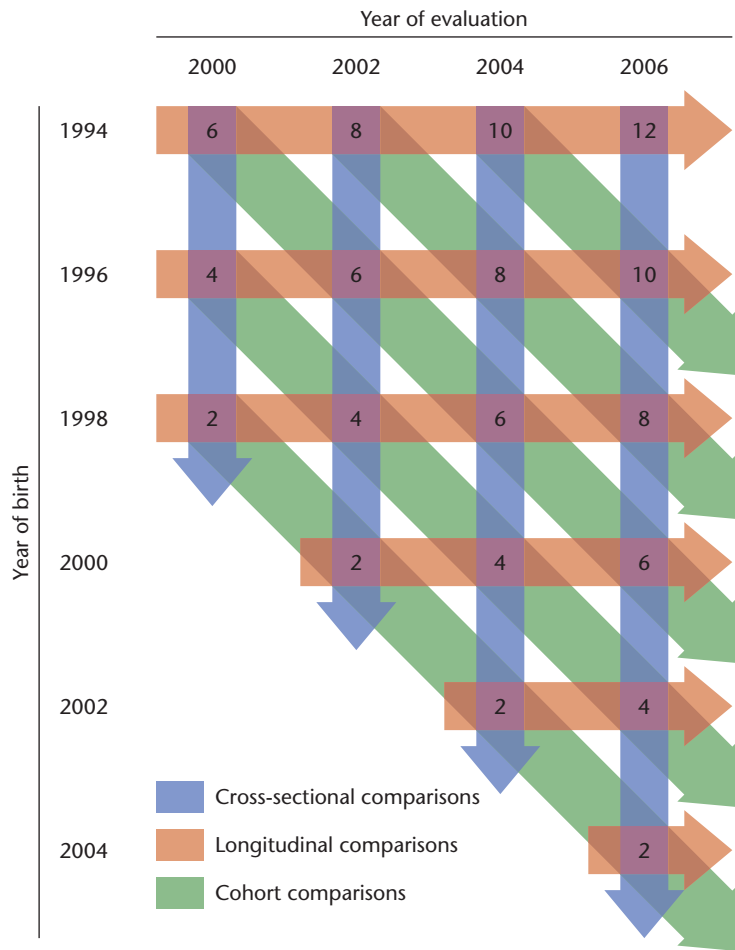
Figure 1-5

Design for a sequential study

This combination of the cross-sectional and longitudinal designs yields a third dimension of measurement that compares cohorts, or people of the same age, at different points in time. The numbers within the arrows are the ages of the groups of children to be studied. For example, in the year 2000, we would do a cross-sectional study of three groups of children, ages 2, 4, and 6. In 2002, we would add a new group of 2-year-olds and we would again measure the earlier groups of children, who would now be 4, 6, and 8. A number of different types of comparisons are possible from such a design. Can you describe some other comparisons that might be made?

pose, for example, that we wanted to study the change in the development of children's reading skills throughout childhood. We might begin by recruiting and testing three samples of children: 2-year-olds, 4-year-olds, and 6-year-olds. We would then test these same children again at periodic intervals, let's say every 2 years. Then, at each of the 2-year measuring points, we would add a new sample of 2-year-olds to the study, which would enable us to compare a larger number of age cohorts. Figure 1-5 displays the design of this study.

There are several advantages of the sequential method. First, the longitudinal aspect of the study allows researchers to examine age-related changes in children. Second, the cross-sectional aspect allows researchers to examine the impact of the year of evaluation and testing or practice effects. Third, in following each age cohort, the design can explore generational effects, or effects of the particular time period in which each group of children was born and raised. For example, perhaps the 6-year-olds originally recruited for this study entered kindergarten when mathematics curricula in the primary grades underwent much change. By comparing these and other age cohorts, we might be able to assess changes in children's mathematics abilities as instructional techniques changed. And finally, the design has a timesaving advantage. Six years after the start of the study, in 2006, the study would include data on changes in mathematics ability that span a period of 10 years (look again at Figure 1-5). This is a 4-year saving over a traditional longitudinal study.

When studying change over time, developmental researchers have a choice of design and method (see Table 1-5 for a comparison of the pluses and minuses of all three approaches). From a practical point of view, it makes sense to select a research method

Table 1-5   Comparison of methods of studying developmental change over time

	Cross-sectional	Longitudinal	Sequential
Time required	Short	Long	Moderate
Ability to control costs	High	Low	Moderate
Ability to maintain potential pool of participants	Excellent	Very problematic	Moderate to good
Continuity of staff	High	Moderate to low	Moderate to high
Flexibility in adapting to new tests and measures	High	Low	Moderate
Likelihood of practice effects	Low	High	Moderate
Ability to assess research issues:			
Normative development data at different ages	Excellent	Excellent	Excellent
Impact of early events on later behavior	Poor	Excellent	Good
Stability vs. instability of behavior	Poor	Excellent	Good
Developmental paths of individuals	Poor	Excellent	Good
Historical or cohort issues	Excellent	Poor	Good

that is ideal for answering the questions posed in a particular study. However, theoretical perspectives do tend to favor some methods over others largely because particular methods are better suited to the kinds of questions that stem from a particular perspective. For example, Freud and other researchers in the psychodynamic tradition often use case studies because they provide the sort of personal detail they seek. Piaget focused on the systematic observation of children, typically in a laboratory. Researchers who use a learning perspective have relied heavily on observational techniques in both the field and the laboratory. Observational analysis permits close inspection of behavioral changes to determine if any learning has occurred. Sociocultural theorists and ethologists also tend to rely on observational techniques, as do many researchers who work from a dynamic systems approach. These techniques may provide evidence of how interactions between a child and her social partner or the cultural or physical environment influence a change in behavior. Life-span researchers tend to use interview techniques, surveys, and objective demographic data such as health and longevity statistics. These techniques capture broader social and historical patterns than are available in firsthand observations. Finally, those who use an evolutionary approach often rely on evidence obtained from comparative observations across species and by paleoanthropologists. This type of information may provide insight into species-level behaviors as well as patterns and differences across species or over very long periods of time.

If researchers from different theoretical perspectives rely on similar methods and perhaps even ask similar questions, where do the main differences among theoretical perspectives lie? The primary difference resides in the ways researchers of different theoretical views interpret the data they collect. For instance, an observation of a child playing with an age-mate may provide the researcher who uses a sociocultural perspective insight regarding social influences on children's problem-solving skills. An ethologist may interpret the very same behaviors in relation to peer dominance hierarchies.

THE ETHICS OF RESEARCH WITH CHILDREN

There are important ethical issues involved in doing research with children. To help researchers understand and address these concerns, various government review boards and professional organizations, such as the American Psychological Association and the Society for Research in Child Development, have suggested guidelines for research in an effort to protect children from dangerous and harmful procedures (see Table 1-6). All

Table 1-6   A Bill of Child Participants' Rights in child development research

1. *The right to be fully informed.* Every child has the right to full and truthful information about the purposes of a study in which he or she is to participate and about the procedures to be used.

2. *The right to give informed and voluntary consent.* Every child has the right to agree, either orally or in writing, to participate in a research project. If a child is too young to understand the aims and procedures of the study and to make an informed decision, researchers must request the informed consent of the child's parents.

3. *The right not to be harmed in any way.* Every child has the right to know that he or she will not experience any physical or psychological harm or damage as a result of the research procedures.

4. *The right to withdraw voluntarily from research.* Every child has the right to withdraw at any time from continued participation in any research project.

5. *The right to be informed of the results of research.* Every child has the right to information about the results of the research project. If the child is too young to fully understand this information, it must be provided to the child's parents. It is understood that sometimes information is in the form of group measures or scores on a task rather than individual scores.

6. *The right to confidentiality.* Every child has the right to know that personal information gathered as part of the research project will remain private and confidential, and that it will not be shared with any other individuals or agencies.

7. *The right to full compensation.* Every child has the right to be fully compensated for her or his time and effort as a research participant, even if the child withdraws and does not complete her or his participation.

8. *The right to beneficial treatments.* Every child has the right to profit from any beneficial treatments provided to other participants in the research project. When experimental treatments are deemed beneficial, for example, participation in a program designed to enhance reading or math skills, participants in control groups who do not receive this treatment during the research study proper have the right to the same participation in the beneficial treatment after the project is completed.

Sources: American Psychological Association, 1992; Society for Research on Child Development Committee on Ethical Conduct in Child Development Research, 1993.

legitimate research projects involving children (and adults) are scrutinized and approved by review boards at the institutions where the research is carried out, including colleges and universities. This scrutiny ensures that researchers follow ethical guidelines.

Among these ethical guidelines, one critical aspect is **informed consent**, an agreement to participate in research based on a clear understanding of the purposes and procedures to be employed in the study. All research with human subjects requires that researchers obtain informed consent from all participants before being included in a study. When participants are young children, parents or legal guardians must provide informed consent on their behalf (Institute of Medicine, 2004). Participants also have the right not to be harmed. This includes protection not only from physical harm but also from psychological and emotional harm, such as feeling uncomfortable or embarrassed. Such experiences are of particular concern in research that involves deception. Recall the experiment by Liebert and Baron (1972), discussed earlier, on the effects of viewing violent TV programs on children's later aggressive behavior toward other children in a "mock" game situation. Even though no child was actually harmed, how might the children have viewed themselves after they participated in the study? Might they have felt ashamed of themselves? Laboratory research involving deception is becoming less common. However, such questions remain important, and careful scrutiny of all ethical issues in research with children is critical.

Developmental research is a tool for increasing our knowledge about children, and it is hoped that the lives of children will benefit from this knowledge. Recently, some investigators and child advocates have called for more stringent criteria regulating the participation of children in psychological research. Others worry that too many additional restrictions will seriously impede the ability of psychologists to learn more about issues that may ultimately lead to benefits for children. The ethics of research in child psychology continue to comprise a topic of much debate.

informed consent Agreement, based on a clear and full understanding of the purposes and procedures of a research study, to participate in that study.

Making the Connections 1-2

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 1's discussion of research methods in child development and discussions in other chapters of this book.

| Chapter 1
Child Development:
Themes, Theories, and Methods

The Longitudinal Method | → | **Early attention predicts later intelligence.**
In Chapter 10, "Intelligence and Achievement," p. 363 |
| | → | **Longitudinal stability of rejection by peers.**
In Chapter 12, "Expanding the Social World: Peers and Friends," pp. 453–454 |
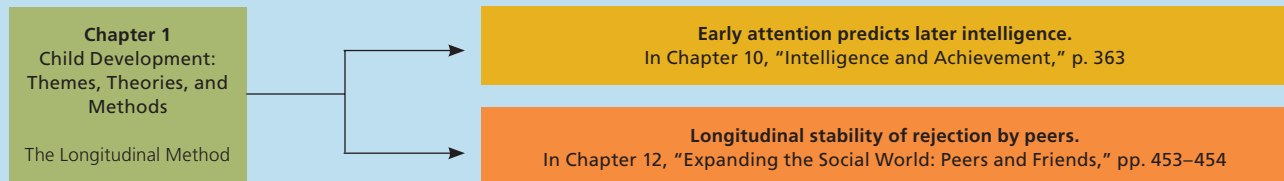
SUMMARY

- **Child development** attempts to account for changes in children's abilities and behaviors as they develop by uncovering the processes that underlie these changes. Scientists also study children to develop practical information that can help those who care for children, such as parents, teachers, health professionals, and legislators.

Themes of Development

- In the past, although development was held by many to be the result of **maturation**, most modern developmentalists recognize the importance of both biological and environmental influences. Many psychologists are concerned with discovering the ways in which biological and environmental factors interact to produce developmental differences.

- Most contemporary developmentalists believe that children actively shape, control, and direct the course of their own development. A number of theorists view development as a continuous process, whereby change takes place smoothly and gradually over time, but others see development as a series of qualitatively different steps or stages. The more closely and more frequently we examine the child's development, the more gradual or continuous the process appears.

- Some developmentalists continue to debate the question of whether individual or contextual influences are more important in determining development. Most developmentalists agree, however, that cultural contexts must be considered in any account of development.

Theoretical Perspectives on Development

- Theories serve two functions. First, they help organize and integrate existing knowledge into a coherent account of how children develop. Second, they foster research by providing testable predictions about behavior. Different theories take different positions on the issues or themes of development, and they also account for different aspects of development. In this sense, they can be seen as complementing rather than as competing with each other.

- **Structural-organismic perspectives** focus on the organized components of the developing organism and how these change in a qualitative way over the course of human development. Two examples of structural-organismic theories are Freud's **psychodynamic theory**, in which the child is motivated by a set of basic biological drives that direct behavior, and Erikson's psychosocial theory. The concepts of **id**, **ego**, and **superego** are integral to Freud's notion of the development of personality, and Freud considered early experiences to be determining influences for later development. According to Freudian theory, later adult personality is a direct result of whether the child's drives were deprived or satisfied at each earlier stage.

- Erikson expanded Freud's theory to include social and cultural factors as influences on the child's development. Erikson's **psychosocial theory** is organized around a series of fundamental personal and social tasks that the individual must accomplish at each stage.

- **Piagetian theory**, also a structural-organismic approach, focuses on intellectual development. In this theory, the child is seen as actively seeking information and new experiences. Children adapt to their environment by assimilating new information or by accommodating their existing frameworks to new information. Development results from increasingly complex reorganizations of understanding as the child moves to more advanced levels of cognitive functioning.

- Learning perspectives emphasize how new behaviors are acquired and see development as a gradual and continuous process. The early learning theories, conceived within the traditional school of **behaviorism**, proposed that learning is regulated by environmental factors that modify behavior by either **classical** or **operant conditioning**.

- **Cognitive social learning theory** has extended the behavioral perspective to include imitation as another form of learning. According to this theory, children are selective about who and what behaviors they imitate.

- **Information-processing approaches** are derived from a learning perspective and focus on how children process information and use this knowledge to guide behavior. This approach has been applied to a wide range of problems in studies of cognitive development and social behavior.

- **Dynamic systems theories** view development from the system level in which individual behaviors are influenced by the other elements or members of the system. The continuing interactions among system members make development a highly dynamic process.

- Contextual perspectives focus on the contributions of social and cultural factors to psychological development. In his **sociocultural theory** of cognitive development, Vygotsky emphasized the interaction between the active child and her social environment. According to Vygotsky, the child grows and changes as a function of her own efforts and by the guidance of more skilled others.

- **Ecological theory** stresses the importance of understanding the relationship between the organism and various environmental systems, such as the family, school, community, and culture. Development involves the interplay between children and their changing relationships with these different ecological systems—the **microsystem**, **mesosystem**, **exosystem**, **macrosystem**, and **chronosystem**. The child's subjective experience of, or understanding of, the environment and the child's active role in modifying the environment are important aspects of this perspective.

- Historical approaches examine the contribution of cohort events to development. Psychologists who view development from a **life-span perspective** are particularly interested in the effects of historical events on human development.

- **Ethological theory** takes a biological-evolutionary approach to describing development. Ethologists, whose primary mode of study is direct observation of behavior in natural settings, study patterns of behaviors across human and infrahuman species and across human societies and cultures.

- **Evolutionary psychology** has influenced developmental research, especially in areas related to cognitive development. The focus in this work is on how the cognitive capabilities and constraints of the organism may reflect survival needs and processes of human evolution.

Themes and Theories: A Final Comment

- Some theoretical perspectives on child development are particularly useful in explaining certain aspects of children's growth and change, whereas other perspectives illuminate other aspects of development. Because every aspect of development is related to several others, it is often useful to apply several different theoretical perspectives to the analysis and study of a particular problem or issue. The interrelatedness of different domains of development makes a systems approach increasingly attractive.

Research Methods in Child Psychology

- Child psychologists use the **scientific method** in their research. They formulate hypotheses on the basis of theories, and they use measurable and replicable techniques to collect, study, and analyze data to test the usefulness of these theories.

- Selecting a **sample** is an important first step in doing research because it determines the extent to which the researcher's conclusions can be applied, or generalized, to people other than those who were studied. To ensure the **representativeness** of a sample, or the degree to which it accurately reflects some larger population, it must include individuals who represent the diversity of the larger population. Conducting a **national survey** is one way to ensure that a sample is representative of a broad range of people.

- Soliciting **self-reports** from children, usually by means of interviews, is one way to gather information about child development. Getting self-reports

from children can be more difficult than getting them from adults, for children tend to be less attentive, slower to respond, and less likely to understand the questions put to them. Self-reports, however, are the only way to obtain information about such things as children's feelings and their unique perspectives on their lives.

- Another data-gathering method is to solicit information about a child from other people who know that child well, such as parents, siblings, teachers, and peers. Attempts to increase the accuracy of parents' reports about their children include focusing on specific current issues in the child's life and using structured procedures such as daily diaries or phone calls. Often, of course, there is no substitute for researchers' **direct observation** of children. Such observations can occur in natural settings, such as a child's home, or in a laboratory; in the latter case, a **structured observation** allows researchers to observe the child as he performs some highly structured task. One limitation of direct observation is that, when children and parents know they are being watched, they act in more socially acceptable ways than they ordinarily would. To minimize such distortions, researchers try to observe unobtrusively for relatively long periods to enable subjects to adapt to the situation.

- The **correlational method** involves examining the relationship between two variables, such as children's aggressive behavior and the amount of aggression they watch on TV. If two factors are correlated, they are systematically related to each other, but a correlation does not tell us whether one factor causes the other.

- A **laboratory experiment** permits researchers to establish cause-and-effect relationships by assessing a specific behavior (e.g., aggression toward another person) in a controlled setting. A certain factor of interest (e.g., viewing TV violence) is introduced to an **experimental group** of participants, while a **control group** is exposed to some neutral factor. Researchers use **random assignment** to assign participants to either of these groups. The **dependent variable** is the behavior affected by the manipulation of the **independent variable**.

- Laboratory experiments cannot easily be generalized to real-world settings. A **field experiment**, in which a researcher deliberately produces a change in a real-life setting and measures the outcome there, has more **ecological validity**. However, researchers have to guard against **observer bias** when working in the field.

- Another way to increase the generalizability of findings is to conduct a **natural experiment**. In this case, the investigator measures the impact on children's behavior of some naturally occurring change. But because of lack of control over the independent variable and other factors that could affect behavior, it is often difficult to interpret the results of a natural experiment.

- The **case study method** takes an in-depth look at a single child or group (e.g., a classroom), often (but not always) one with some uncommon feature that makes the child or group of special interest to developmentalists.

- The most common strategy for investigating developmental change over time is the **cross-sectional method**, in which researchers compare groups of children of different ages at a given point in time. This approach is economical in terms of both time and money, but it yields no information about change or about the causes of any observed age-related differences in the child participants. The **longitudinal method** overcomes these two drawbacks of cross-sectional research because the researcher examines the same children at different points in their lives. But longitudinal research has its own disadvantages, including high cost, gradual loss of subjects, limited flexibility in using new insights or methods once the study has begun, and the question of the applicability of findings to other **age cohorts**.

- To overcome some of these limitations, researchers can use the **sequential method**, which combines features of both cross-sectional and longitudinal studies. This design enables researchers to compare not only groups of children of different ages at one point in time and to track individual children over a period of years but also to track age cohorts over a number of years.

The Ethics of Research With Children

- A major consideration when deciding on a research strategy is the effects the procedures will have on participants. Various government and institutional review boards, in addition to professional organizations, are involved in setting and maintaining guidelines for the proper treatment of human subjects in research. These guidelines include the right to **informed consent** before participating and the right not to be harmed. To determine if certain research procedures are ethical or not, the costs to participants must be carefully weighed against the potential benefits of increased knowledge about children's development.

EXPLORE AND DISCUSS

1. Do you think all theories are equally useful for explaining all aspects of development? Or do you think some theories are more helpful than others in explaining particular aspects of development, such as motor skills, social behavior, or cognitive development? Explain why.

2. Some theories, such as Freud's, are more than 100 years old. Are old theories still relevant to contemporary children? Discuss the ways you think some of the classic theories can be useful today.

3. What themes of development do you think are most important and why?

4. What research methods should you use if you want to determine what causes a particular behavior or event? Explain the difference between causation and correlation.

5. What are some of the limitations of longitudinal methods as a way of studying children? Do you think these methods are worth the effort or not? Explain your answer.

6. Do you think the use of deception by Liebert and Baron in their study of the effects on children of viewing TV violence was ethical? Could it be justified on the grounds that we need to find a way to prevent aggression and violence among youth? What are some other ways researchers might evaluate the effect of TV violence on children?

Frida Kahlo (1907–1954). *My Grandparents, My Parents, and I (Family Tree)*, 1936.

Museum of Modern Art, New York.

2.

Heredity and the Environment

One of the most striking things about newborns in a hospital nursery is their diversity. From the moment they're born, babies differ from one another not only in physical appearance but also in behavior. One baby may sleep most of the time; another may be quite alert, visually scanning the surroundings as if exploring them; a third baby may be irritable and cry a lot. What contributes to these individual differences at such a young age? Transactions among a vast array of hereditary and environmental factors begin before birth. Such transactions between genes and the environment make each newborn unique, and they continue to shape the individual's characteristics throughout his or her life.

The concepts of genotype and phenotype provide a framework for exploring the interactions of genes and environment. A **genotype** is the particular set of genes that a person inherits from his or her parents and that determines such characteristics as height and eye color. With the exception of identical twins, no two people have exactly the same genotype. During the course of development, the genotype interacts with the environment to produce the **phenotype**, which is the observable and measurable genetic expression of an individual's physical and behavioral characteristics. Psychologists study these kinds of characteristics—for example, motor abilities, intellectual skills, social behavior, emotionality, and personality traits—to increase our understanding of how genetic and environmental factors interact to produce each unique human being.

We begin this chapter by exploring what genes are and how they are transmitted from generation to generation. Next we examine how genes guide development, from determining a child's sex to countless other characteristics. We go on to examine genetic testing and counseling for would-be parents who face the prospect of having a child with a troubling disorder, and we explore the growing field of genetic engineering. Then we consider heredity-environment interactions. We discuss both the ways environmental factors influence the expression of an individual child's genetic makeup and also the way that genetic makeup can shape the environment.

genotype The particular set of genes a person inherits from his or her parents.

phenotype The visible expression of the person's particular physical and behavioral characteristics; created by the interaction of a person's genotype, or genetic makeup, with the environment.

ovum The female germ cell, or egg.

sperm The male germ cell.

chromosomes Threadlike structures, located in the nucleus of a cell, that carry genetic information to help direct development.

meiosis The process by which a germ cell divides to produce new germ cells with only half the normal complement of chromosomes; thus male and female germ cells (sperm and ovum) each contain only 23 chromosomes so that when they unite, the new organism they form will have 46 chromosomes, half from each parent.

crossing over The process by which equivalent sections of homologous chromosomes switch places randomly, shuffling the genetic information each carries.

Finally, to further your understanding of how genes and the environment interact, we explore the relative contributions of these two forces to intellectual development and to aspects of socioemotional development such as temperament and the development of personality.

THE PROCESS OF GENETIC TRANSMISSION

One of the marvels of human development occurs in the brief period of 9 months as a human being develops and enters the world. This 9-month gestational process has a microscopic beginning. In the dark, warm, moist environment of a woman's *oviduct*, sperm and egg unite to create a new living organism with the potential to develop into a human being. This new organism, called a *zygote* (we discuss the zygote in detail in Chapter 3), results from the union of the male and female gametes, or reproductive cells, each of which carries genetic information. The egg, or **ovum**, the largest cell in the human body, is about 90,000 times as heavy as the sperm; nevertheless, it is still quite small, smaller even than the period at the end of this sentence. The **sperm**, the smallest cell in the body, is shaped by a head, where the hereditary information is, and a whiplike tail, which it uses to propel itself through the woman's reproductive system in search of the ovum. This beginning is the start of a 9-month period that normally ends with a full-term baby, 7 or 8 pounds and 20 or so inches long, ready to enter the world. The hereditary material that guides this developmental process is carried in the chromosomes and the genes.

Chromosomes and Genes

Chromosomes and genes are located inside the nucleus, or center, of the cell. At the moment of human conception, when the sperm and egg cells unite, 23 chromosomes from each of these cells join together to create 23 chromosome *pairs*, or 46 chromosomes in all. The threadlike **chromosomes** carry genetic information that helps direct development. An individual's 46 chromosomes are in 23 pairs, with half of each pair from the father and half from the mother. This pairing is possible because each chromosome contributed by the father's sperm is *homologous* (similar in shape and function) to one of the chromosomes contributed by the mother's egg. Copies of these original 23 homologous pairs of chromosomes are passed on to every cell in a person's body with one exception: the reproductive cells. Each reproductive cell contains only 23 single chromosomes instead of the usual 46 because during its development it undergoes a special form of cell division, called **meiosis**, in which its 23 chromosome pairs are split or halved (see Figure 2-1). The reason for this halving becomes clear when sperm and egg unite. Now 23 chromosomes from the sperm combine with 23 chromosomes from the egg to produce the correct number of 46 chromosomes for a new human being.

Both meiosis and sexual reproduction are crucial to the process of genetic transmission because each facilitates the production of a tremendous diversity of genetic combinations. During meiosis, when a male's or a female's set of chromosomes is halved to produce a germ cell—sperm or egg—that halving process mixes chromosomes that originated from the individual's father with chromosomes that originated from the individual's mother. Moreover, this mixing process is totally random. The only requirement is that one of each pair of homologous chromosomes ends up in the new reproductive cell. This random assortment of homologous chromosomes makes possible the production of about 8 million different chromosome combinations in both a female's eggs and a male's sperm. Further genetic variability is added during meiosis by a process called **crossing over**, in which equivalent sections of homologous chromosomes randomly switch places (Figure 2-1), so that genetic information is shuffled even more. In view of all of these shuffling and sorting processes, it is no wonder the chances of any given
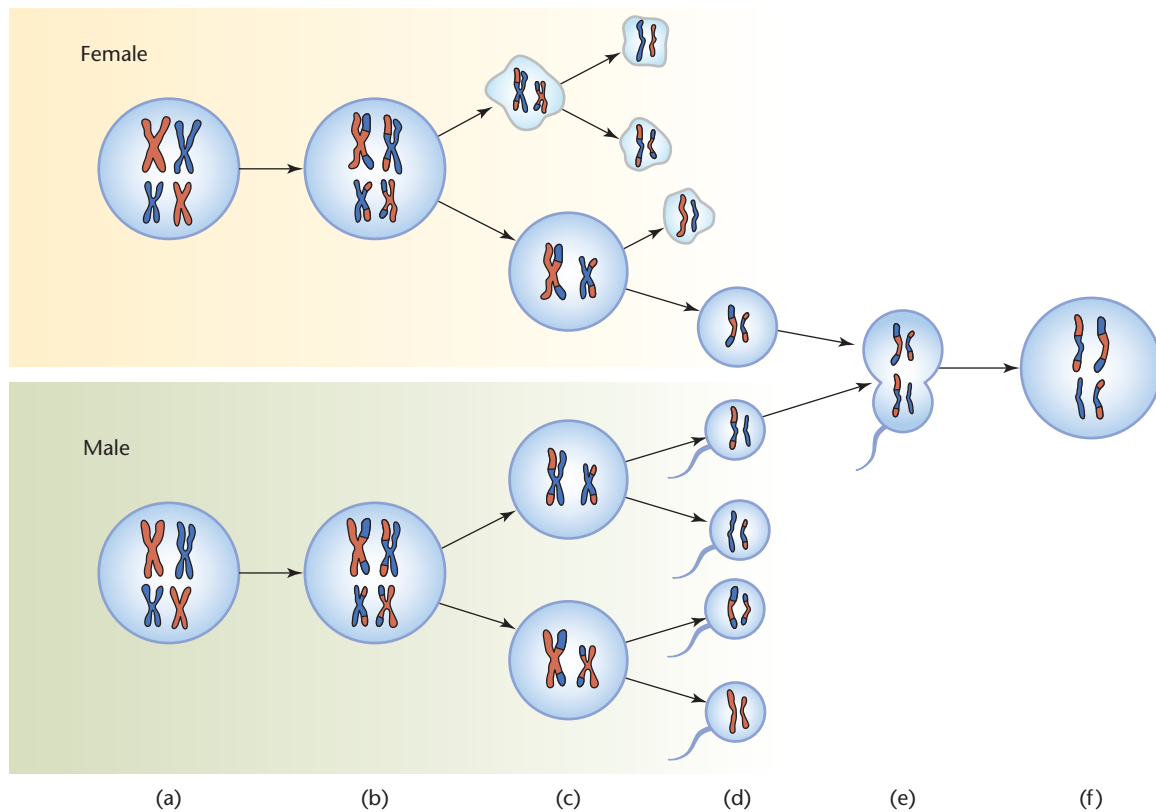
Figure 2-1

Meiosis: The reproductive cells divide to produce new germ cells with half the normal complement of chromosomes

As meiosis begins, all the chromosomes in the cell replicate themselves, as if they were about to undergo *mitosis*, or normal cell division (see Figure 2-2). In (a), we see the results of this replication (we show cells with only 4 chromosomes, or 2 pairs, rather than the full complement of 46 chromosomes, or 23 pairs). In (b), *crossing over* between chromosomes ensures the zygote's unique genetic inheritance. In (c), the male chromosome pairs separate to form two cells, each with 23 chromosomes. In the female, two cells are also formed, but one is nonfunctional and may or may not produce two more nonfunctional cells. In (d), the chromosomes separate once again, in the male forming four sperm cells and in the female a single ovum and a fourth nonfunctional cell. (The genetic material in the female's nonfunctional cells degenerates.) When a sperm cell fertilizes an ovum (e), a zygote is formed (f), with 23 chromosome pairs, or 46 in all.

man and woman producing two genetically identical children is one in many trillion (except, of course, when a single fertilized egg splits into identical twins).

In Chapter 3, we will follow the progress of the fertilized egg, or zygote, as it develops within the mother's body, becoming an embryo, then a fetus, and finally, at birth, an infant. Here we may ask, however, how the single cell created by the union of egg and sperm becomes a complex living being. By a process called **mitosis**, which occurs in both **autosomes** (chromosomes that contain matching pairs) and sex chromosomes (which we discuss on page 42), a cell duplicates its chromosomes and then divides into daughter cells that have the exact same number of chromosomes as their parent cell (see Figure 2-2). Thus, the zygote divides and continues to divide, each time producing new cells that have the full complement of 46 chromosomes and gradually becoming a multicellular organism.

Genes, DNA, and Proteins

Scientists know that the binding element of a chromosome is a long, thin molecule of **deoxyribonucleic acid**, or **DNA**. This molecule, which stores genetic information and

mitosis The process in which a body cell divides in two, first duplicating its chromosomes so that the new daughter cells produced each contain the usual 46 chromosomes.

autosomes The 22 paired non-sex chromosomes.

deoxyribonucleic acid (DNA) A ladderlike molecule that stores genetic information in cells and transmits it during reproduction.

Figure 2-2

Mitosis: The zygote divides and keeps dividing to produce a multicellular organism

In (a), we see a zygote with only 4 chromosomes rather than the 46 each cell normally contains. In (b), each chromosome splits in half (lengthwise) to produce a duplicate of itself. Next, in (c), the duplicates move away from each other as the cell begins to divide. Finally, in (d), the cell has divided in two, and each new cell has the same set of chromosomes as the other and as the original parent cell (a).

(a)   (b)   (c)   (d)

nucleotide A compound containing a nitrogen base, a simple sugar, and a phosphate group.

gene A portion of DNA located at a particular site on a chromosome and that codes for the production of certain kinds of proteins.
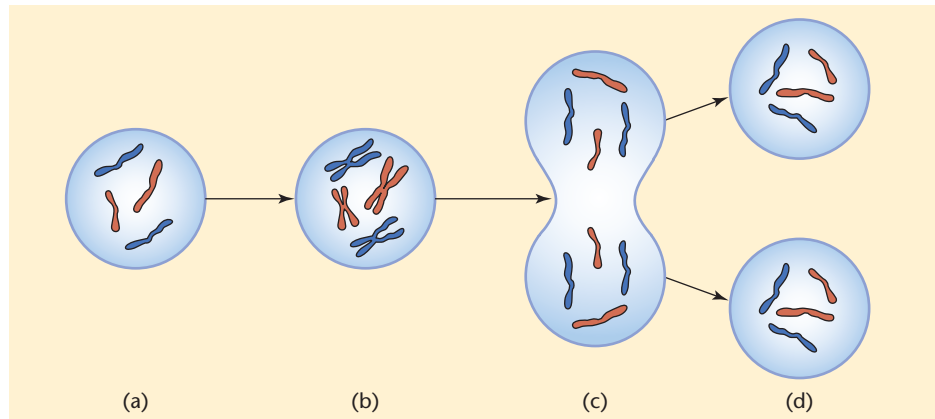
transmits it during reproduction, is made up of building blocks called nucleotides that are held together by two long, twisted parallel strands that resemble the two side rails of a spiral staircase (see Figure 2-3). From each **nucleotide**, which is a compound consisting of a nitrogen base, a simple sugar, and a phosphate group, one of four different nitrogen-containing bases projects out toward the base opposite it to form one of the staircase's "risers." Only bases that are compatible with each other will bond together. As Figure 2-3 shows, adenine and thymine form a bond, as do cytosine and guanine, but no other combination of these four is possible in DNA.

How do chromosomes carry the units of hereditary information? Portions of the chromosome's DNA molecule, called **genes**, are located at particular sites on the chromosome, where they code for the production of certain kinds of proteins. The genetic code is "written" in the order in which the four bases occur in the gene, much as the code for the meaning of a word is written in the order of its letters. Genes trigger the

Figure 2-3

The structure of DNA

The two twisted strands of DNA form a kind of spiral structure that is composed of the complementary base pairs of nucleotides, adenosine–thymine or guanine–cytosine.
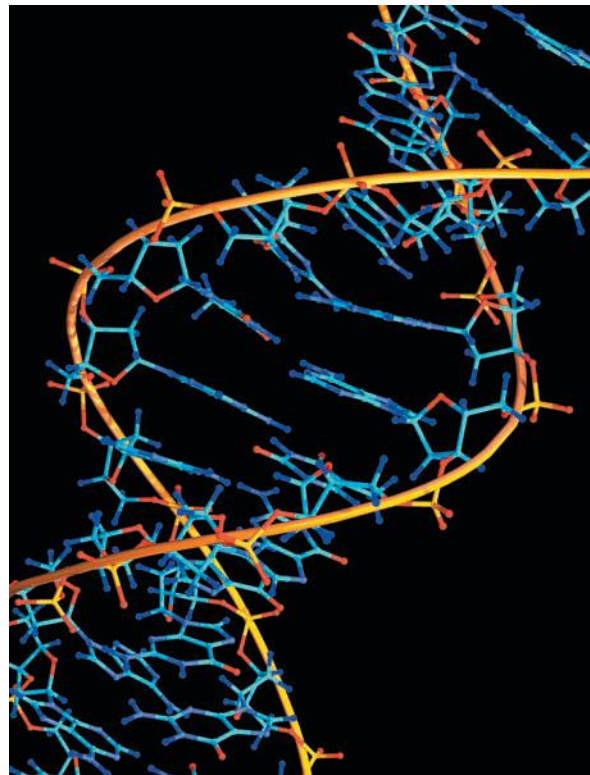
production of proteins only when a particular change in the environment signals them to activate. Now the gene, or DNA segment, splits down the middle so that its pairs of bases are no longer joined. According to the rules by which the four bases bond with each other, "free" nucleotides surrounding the gene connect to the exposed bases to form new pairs. The resulting copy of the gene then travels from the cell nucleus to the body of the cell, where protein synthesis takes place. The copy acts as a template for building protein molecules: Each sequence of three bases codes for one of the many amino acids (organic compounds) that combine to form different kinds of proteins.

When the protein molecule is assembled, it is ready to begin its work in the body. Each of the many different types of proteins serves a different function. Some proteins give cells their characteristic physical properties. For example, bone cells get their hardness, skin cells their elasticity, and nerve cells their capacity to conduct electrical impulses from the different kinds of proteins they possess. Other proteins do many other jobs within the body, such as triggering chemical reactions, carrying chemical messages, fighting foreign invaders, and regulating genes. It's the combined action of all the proteins in a human body that composes a living organism, each of whose specialized cells and organ systems has distinctive characteristics.

GENETIC INFLUENCES ON DEVELOPMENT

Scientists are learning more and more about how genes exert their influences on development. The central fact they have discovered is that, at least with respect to behavior, *genes never work in isolation, but always in combination with environmental influences* (Rutter, 2006; Turkheimer, 2000). A gene alone is useless. Its coded message cannot be "read" unless it is embedded in an environment that signals when and how it should respond. But because the topic of genetic-environmental interactions is so complex, in this and the next major section, we'll focus on genetic influences apart from environmental ones. We'll return to the critical determining process of gene-environment interaction in the last two sections of the chapter.

The Transmission of Traits: A Basic Model

Two basic concepts are crucial to understanding genetic influences on development. First, at any given gene's position on two homologous chromosomes, there can be more than one form of that gene; these alternate forms are called the gene's **alleles**. One of these alleles comes from the person's mother, and the other from the person's father. Second, if the alleles from both parents are the same, the person is said to be **homozygous** for that particular gene or for the trait associated with it. If the two alleles are different, the person is **heterozygous** for that particular characteristic. If *A* represents one allele and *a* another, the individual can have one of three possible combinations: *AA, aa*, or *Aa (aA)*.

When a person has one of the first two of these combinations (*AA* or *aa*), she or he is homozygous for the trait because it is coded by the two identical alleles. Thus, for example, a person with two alleles for dark skin will have dark skin, and a person with two alleles for light skin will be light in skin color. When a person has a variant of the third combination, however, he or she is heterozygous for the trait for which each allele codes, and the result of this combination may vary. Sometimes, the combination of two dissimilar alleles will produce an outcome intermediate between the traits for which each single allele codes. For instance, a light-skinned parent and a dark-skinned parent may produce a child of intermediate skin color. A second possibility is that both alleles will express their traits simultaneously; that is, the two traits will combine but will not blend. For example, the allele for blood type A in combination with the allele for blood type B produces the blood type AB, which has both kinds of antigens, A and B, on the

allele An alternate form of a gene; typically, a gene has two alleles, one inherited from the individual's mother, and one from the father.

homozygous The state of an individual whose alleles for a particular trait from each parent are the same.

heterozygous The state of an individual whose alleles for a particular trait from each parent are different.

codominance A genetic pattern in which heterozygous alleles express the variants of the trait for which they code simultaneously and with equal force.

dominant The more powerful of two alleles in a heterozygous combination.

recessive The weaker of two alleles in a heterozygous combination.

surface of the red blood cells. This pattern is called **codominance** of the two alleles. A third possibility is that in a heterozygous combination, the characteristic associated with only one of the alleles may be expressed. The more powerful allele is said to be **dominant** over the weaker, **recessive** allele. An example is the dominant allele for curly hair combined with the recessive allele for straight hair; this combination produces a person whose hair is curly (Table 2-1). Fortunately, many deleterious alleles, those that result in serious disorders, are recessive, which greatly reduces the incidence of genetic abnormalities in people. One of the reasons many societies prohibit marriage between close blood relatives is that a harmful recessive allele possessed by one relative is more apt to be possessed by other relatives as well, thus increasing the chances that children of their intermarriage will be homozygous for the harmful trait.

Genes on the Sex Chromosomes: Exceptions to the Rule

The genes on the sex chromosomes provide an exception to the rule we've just discussed, for not all of these genes have two alleles. But before we examine this special situation, we must back up a bit in our story. As we said earlier, in every human being, 1 of the 23 pairs, or 2 of the 46 human chromosomes, are called **sex chromosomes**; these chromosomes have the important function of determining the individual's sex, and they differ in males and females (see Figure 2-4). A female has two large, homologous sex chromosomes, the XX chromosomes, one from her mother, and the other from her father. A male, on the other hand, has one X chromosome from his mother and a smaller Y chromosome from his father; this pattern is referred to as XY. Because an X chromosome is about five times longer than a Y chromosome, it carries more genes. This means that some genes on a male's X chromosome will have no equivalent genes on his Y chromosome, and as a result, any recessive **X-linked genes** will automatically be expressed; the male's Y chromosome has no counteracting dominant genes. In females, X-linked recessive genes are expressed much less frequently because females, who have two X chromosomes, have a chance of inheriting a dominant and counteracting allele on the other X chromosome.

sex chromosomes In both males and females, the 23rd pair of chromosomes, which determine the individual's sex and are responsible for sex-related characteristics; in females, this pair normally comprises two X chromosomes, in males an X and a Y chromosome.

X-linked genes Genes that are carried on the X chromosome and that, in males, may have no analogous genes on the Y chromosome.

Table 2-1

Some common dominant and recessive traits

Dominant	Recessive
Curly hair	Straight hair
Normal amount of hair	Baldness
Dark hair	Light or blond hair
Blond or brunette hair	Red hair
Normal skin coloring	Albinism (lack of skin pigmentation)
Roman nose	Straight nose
Thick lips	Thin lips
Cheek dimples	No dimples
Double-jointedness	Normal joints
Normal color vision	Color "blindness" (red and green not distinguished)
Farsightedness	Nearsightedness (myopia)
Immunity to poison ivy	Susceptibility to poison ivy
Normal hearing	Congenital deafness
Normal blood clotting	Failure of blood to clot (hemophilia)
Normal protein metabolism	Phenylketonuria
Normal red blood cells	Sickle-cell anemia

Figure 2-4

Normal chromosome arrangements

This *karyotype*, or photograph of chromosome pairs, shows the normal lineup of chromosomes in a female. The 22 pairs are similar in both sexes, but the 23rd pair differs. In the female, this pair has two X chromosomes, or an XX pattern, marked in the photo as "X." In the male, this pair has one X and one Y chromosome, or an XY pattern, discernible by the smaller size of the Y chromosome.

Hemophilia, a disorder in which the blood fails to clot, is an example of an X-linked recessive characteristic. Because the allele for hemophilia is recessive, a female who inherits it will have normally clotting blood as long as her second allele, inherited from her other parent, does not code for hemophilia. Only if she is homozygous for the recessive allele will her blood clotting be impaired. If a male receives the hemophilia allele on his X chromosome, he is in greater danger of developing hemophilia. Like the female, he will develop the disorder if he receives another hemophilia allele on his Y chromosome; however, he will also develop hemophilia if he receives no counteracting gene on his Y chromosome. Only if the small collection of alleles on his Y chromosome happens to include one for normal blood clotting will he escape the disorder.

Many other X-linked recessive disorders are more common in men than in women, including color blindness, certain forms of night blindness, atrophy of the optic nerve, one form of muscular dystrophy, and a disorder resulting in an inability to produce antibodies to fight certain bacterial infections. Males' higher rates of mortality compared with those of females—whether through miscarriage before they're born, death in infancy, or early death in adulthood—are partly attributable to males' greater vulnerability to X-linked disorders. Even resistance to certain childhood diseases appears to be X-linked. Thus, although 120 males are conceived for every 100 females and 106 males are born for every 100 females, this numerical imbalance between the sexes decreases over the course of development.

hemophilia A disorder, caused by an X-linked recessive gene, in which the blood fails to clot; found more often in males than in females.

Interactions Among Genes

So far, we have presented a relatively simple genetic model in which a single allele or a single pair of alleles determines a particular characteristic. Although this model applies to certain human traits, many other characteristics are determined not by one pair of alleles but by many pairs acting together. In fact, most characteristics of greatest interest to psychologists, such as intelligence, creativity, sociability, and style of emotional expression, are probably influenced by the interaction of multiple genes.

This interaction may help explain why some traits influenced by genes do not tend to run in families. Development of such traits usually depends on a certain configuration of many genes, and that particular configuration is not likely to be passed on from parent to child. A likely example is genius. Why are geniuses sometimes born to parents of

quite ordinary intelligence, and why do geniuses go on to produce children who are not unusually talented? Such cases make sense if you consider genius a trait that emerges from a particular configuration of many genes, all interacting with each other (Lykken et al., 1992; Turkheimer, 2000).

To further complicate the nature of genetic inheritance, we now know that a single pair of alleles may influence more than one trait. Moreover, they may do this not directly but indirectly, through their effects on the expression of still other genes. Genes that act in this manner are called **modifier genes**. One example is the modifier gene that affects the early development of *cataract*, a condition in which the lens of the eye becomes clouded, obscuring vision. Although the occurrence of early cataract is determined by a dominant gene, the nature of cataract formation is influenced by modifier genes. These kinds of genes determine, for example, whether the cloudiness forms along the periphery of the lens or at its center.

modifier genes Genes that exert their influence indirectly, by affecting the expression of still other genes.

Genetic Disorders

Genes can have both positive and negative effects on development. As we've seen, people can inherit harmful alleles of certain genes such as the ones that cause hemophilia or early cataract. It's also possible for a person to receive whole sets of genes that are not only harmful but fatal. In this section, we will look at some of the genetic abnormalities that can interfere with normal development. Table 2-2 summarizes the chief characteristics of some of the disorders these abnormalities cause.

WHY HARMFUL ALLELES SURVIVE   A major reason potentially harmful alleles survive is that they are not harmful in the heterozygous state—that is, when a person inherits both a normal allele and a recessive one. A good example is the allele that causes **phenylketonuria**, or **PKU**. PKU is caused by a recessive allele that fails to produce an enzyme necessary to metabolize the protein phenylalanine present in milk, the basic diet of infants. As long as a person also possesses a normal allele, the PKU allele has no ill effects. In fact, about 1 of every 20 European Americans carries the recessive PKU allele and doesn't even know it. Problems arise only in infants who are homozygous for the recessive gene. After birth, when these babies start ingesting milk, their bodies cannot break down phenylalanine. If these infants are not treated, toxic substances accumulate in their bodies, damaging the nervous system and causing mental retardation. Figure 2-5 (p. 47) shows that two heterozygous parents have a one in four chance of producing an infant who is homozygous for PKU. Most people who carry the PKU allele also have a normal allele, so they do not succumb to the disorder. Because these individuals survive and reproduce, however, the defective allele also survives from generation to generation, even though its effect may be seen only 25% of the time (when these individuals mate).

phenylketonuria (PKU) A disease caused by a recessive allele that fails to produce an enzyme necessary to metabolize the protein phenylalanine; if untreated immediately at birth, damages the nervous system and causes mental retardation.

Some potentially harmful alleles may survive because they are actually beneficial in combination with a normal allele. Sickle-cell anemia, a disease to which some African Americans as well as people in some African countries are subject, provides an example. Box 2-1 (see p. 48) describes this disorder and how its allele actually helps some people survive another life-threatening disease: malaria.

CHROMOSOME ABNORMALITIES   Developmental disorders can be caused not only by single genes or gene groups but also by defects in entire chromosomes. Almost 1% of all newborns have diagnosable chromosome abnormalities, and it has been estimated that 60% of early spontaneous abortions and 5% of later miscarriages are attributable to aberrations in chromosomes. Normally, such chromosome defects are not present in a child's parents, as are the defective alleles we've been discussing. Instead, they generally arise during the process of meiosis, when eggs or sperm are formed. In a great many instances, the aberration proves lethal, and the zygote

Table 2-2   Some disorders that are caused by genetic defects

Disorder and Its Nature	U.S. Incidence	Cause	Method of Diagnosis	Current Methods of Treatment and Prevention
Hemophilia				
Blood disease characterized by poor clotting ability	1/10,000 (80–90% males)	Heredity: X-linked recessive trait	Blood tests	Hemophilia is treated at present by transfusions of clotting factors. New gene-splicing techniques may make it possible to provide these factors without running the risk of transmitting blood-borne infections through donated blood products.
Diabetes mellitus				
Body's inability to metabolize carbohydrates and maintain proper glucose levels	Type I: 1/200 Type II: 1/50	Heredity: multigene, exaggerated by environmental factors	Blood and urine tests	Sufferers can often control this disorder by special diet alone. In other cases, oral medication and/or insulin injections are required to maintain the body's equilibrium.
Phenylketonuria (PKU)				
Inability to convert phenylalanine to tyrosine; untreated, leads to mental retardation	1/10,000	Heredity: recessive allele	Blood tests prenatally or at birth	Genetic counseling can indicate the risk that a couple will have a PKU child. Modern genetic techniques can detect recessive alleles before such a child's birth, and immediately after birth, a special diet can be instituted to prevent the disorder's toxic effects.
Sickle-cell anemia				
Blood disease characterized by malformation of red blood cells that are low in oxygen	1/600 African American infants affected; 1/13 African Americans are carriers	Heredity: two recessive alleles in combination	Blood tests	Blood transfusions have until recently been the only treatment. Drugs that turn on a normally dormant fetal hemoglobin gene may help prevent symptoms.
Down syndrome (trisomy 21)				
Physically and mentally retarded development; sometimes, cardiovascular and respiratory abnormalities	1/1,000	Heredity: extra full or partial chromosome 21	Amniocentesis, alphafetoprotein assay, chorionic villi sampling, chromosome analysis	Special physical training; special education, including speech therapy. Surgical correction of problems with the heart and hearing are sometimes necessary.

(continued)

Table 2-2　*(concluded)*

Disorder and Its Nature	U.S. Incidence	Cause	Method of Diagnosis	Current Methods of Treatment and Prevention
Turner (XO) syndrome Underdeveloped secondary sex characteristics; infertility; short stature; social immaturity; webbed neck; cardiovascular and renal abnormalities	1/1,200–4,000 females	Chromosomal abnormality: only one X chromosome instead of two	Blood tests	Hormone therapy can promote development of secondary sex characteristics. Counseling; special education to lessen deficits in spatial understanding.
Triple-X (XXX) syndrome Some physical abnormalities, including menstrual irregularities and premature menopause; some limitations on cognitive abilities	1/1,000 females	Chromosomal abnormality: extra X chromosome	Blood tests	Special education to improve cognitive skills.
Klinefelter's (XXY) syndrome Some female physical characteristics; sterility; mild to severe cognitive difficulties	1/1,000 males	Chromosomal abnormality: extra X chromosome	Blood tests	Testosterone treatments can enhance development of male secondary sex characteristics as well as sexual interest and assertiveness. Special education to improve cognitive skills.
XYY syndrome Unusual height; some cognitive impairment; attention deficit	1/1,000 males	Chromosomal abnormality: extra Y chromosome	Blood tests	Special education as needed.
Fragile X syndrome Physical abnormalities; mental retardation that deepens with time; psychological and social problems	1/2,000–4,000 males 1/5,000 females	Heredity: breaking of an X chromosome near its tip due to multiple repeats	Blood tests	No known treatment.

Sources: Lambert & Drack, 1996; Lin et al., 1993; Martini, 1995; Money, 1993; Nightingale & Meister, 1987; Postlethwait & Hopson, 1995.
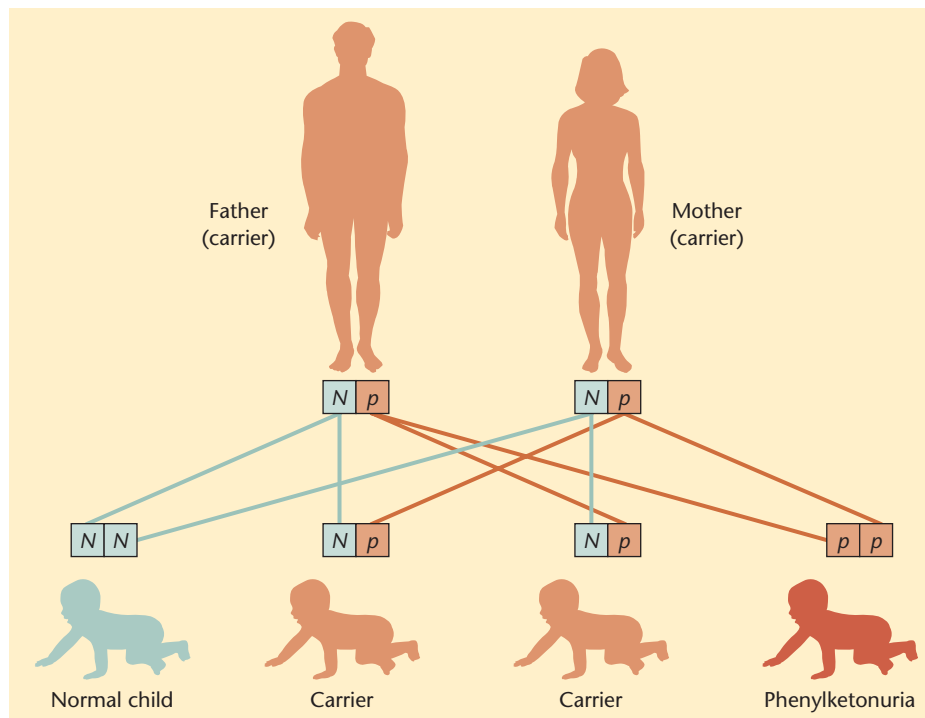
Figure 2-5

Genetic transmission of phenylketonuria

When both parents carry the recessive allele for phenylketonuria, they have a one in four chance of producing a child with the disorder. If their dominant genes for normality (*N*) are passed to their offspring, the child will be normal. If the child receives one dominant and one recessive gene (*p*) it will be a "carrier"; that is, the child will not have the disorder, but it may pass the recessive allele to its own children. And of course, if the child receives recessive genes from both parents, it will have phenylketonuria.

produced by the union of sperm and egg spontaneously aborts. But sometimes, particularly when certain chromosomes are involved, a zygote is able to survive the abnormal condition, and a baby with a chromosome defect is born.

Down Syndrome **Down syndrome** is characterized by physical and mental disability and a distinctive physical appearance. People with this syndrome are typically of short stature and usually have almond-shaped eyes with a fold in the eyelid, as well as one or more other unusual physical characteristics. More troublesome is their heightened susceptibility to such illnesses as leukemia, heart disorders, and respiratory infections and their moderate to severe mental disability. However, with advances in the treatment of these physical disorders (e.g., the use of antibiotics for pneumonia), the life spans of people with Down syndrome have greatly increased; currently, about 70% of individuals with Down syndrome live into their 60s. Unfortunately, they are at greater risk for developing Alzheimer's disease in later life than the average person (Hayes & Batshaw, 1993).

Probably the best-known chromosome disorder, Down syndrome is caused by a deviation in the set of chromosomes labeled number 21. Instead of a pair of these chromosomes, the person with Down syndrome has three chromosomes, which is why the disorder is also called *trisomy 21*. The extra 21st chromosome most often comes from the mother's egg, when her homologous pair of 21st chromosomes fails to separate during meiosis. Male sperm carry the extra chromosome in only about 5% of cases (Antonarakis & Down Syndrome Collaboration Group, 1991). And for reasons that are not yet fully understood, this error occurs more often as women age (see Table 2-3). The father's age matters, too; Down syndrome births are higher for men over 40, especially if the mother is over age 35. The combination of two older parents increases the risk because in younger women who are not at risk for producing a child with Down syndrome, there was no paternal effect (Lewis et al., 2006). Scientists have identified a gene that may play a role in the mental impairment associated with Down syndrome, but other genes likely play a role as well (Smith et al., 1997).

Down syndrome A form of chromosome abnormality in which the person suffers disabling physical and mental development and is highly susceptible to such illnesses as leukemia, heart disorders, and respiratory infections.

BOX 2-1

Risk and Resilience

SICKLE-CELL ANEMIA: A DOUBLE-EDGED SWORD

Sickle-cell anemia, a severe and often fatal disorder, affects about 60,000 people in the United States (Driscoll, 2007). It is far more common, however, among African Americans than among other Americans; about 8% of African Americans carry a recessive sickle-cell allele. **Sickle-cell anemia** gets its name from the peculiar shape that the red blood cells of an afflicted person assume when they are low in oxygen (e.g., when they have just released oxygen to hardworking muscle cells). Rather than remaining disk shaped, as normal red blood cells do, these cells become elongated and bent into the shape of a sickle (see Figure 2-6). This shape causes them to get stuck in small blood vessels, especially in the joints and the abdomen, resulting in severe pain, tissue damage, and possible death if critical vessels in the brain and lungs become blocked. Moreover, because these cells are abnormal, the spleen continually removes them from the blood, giving rise to chronic *anemia* (too few red blood cells). An allele on chromosome number 11 is the cause of sickle-cell anemia. When its companion allele is also recessive for this trait, the person develops the disorder. Among people who have one sickle-cell allele and one normal one, however, red blood cells rarely sickle except under conditions of low oxygen, such as in mountain climbing or under anesthesia, and as a result, such people usually suffer no harmful effects from the defective allele.

Scientists were once puzzled as to why the sickle-cell allele is so prevalent among African Americans, in many African communities, and in some societies in the Middle East (Driscoll, 2007). Among the Baamba, for instance, 39% of the population has the sickle-cell gene. The mystery was solved with the discovery that the sickle-cell allele also has a positive effect: It confers protection against malaria, another deadly disease found in almost exactly the same areas as the sickle-cell allele. When malaria parasites take up residence in the red blood cells of someone who is heterozygous for this disorder, or who has one sickle-cell allele and one normal one, the cells become sickle-shaped when low in oxygen, just as such cells typically behave in people who are homozygous for the allele. But in this case, when the spleen removes the parasite-containing cells from the blood, it removes the malaria parasites as well. As a result, people with only one sickle-cell allele have built-in resistance to malaria—an enormous aid to survival.

Because the defective allele enables these people to fight off malaria, they tend to live longer than people who haven't a sickle-cell gene to protect them, and they reproduce more often; thus, they pass the gene on to subsequent generations in increasing numbers. In this way, a potentially harmful gene not only survives but flourishes. Of course, for the person who is homozygous for sickle-cell anemia, or has two recessive genes for this disorder, the illness itself is so life-threatening that the person's enhanced resistance to malaria is of little benefit.

Until recently, there was little hope for victims of sickle-cell anemia. The successful in utero treatment

sickle-cell anemia A disorder, caused by a recessive gene, in which the red blood cells become distorted when low in oxygen, causing fatigue, shortness of breath, and severe pain and posing a threat to life from blockage of crucial blood vessels.

Infants with Down syndrome may develop fairly normally for their first 6 months, but unless they receive special therapy, their rate of intellectual growth begins to decline after about a year. Children with Down syndrome are generally slow to learn to speak and often have difficulty articulating words. They also have trouble attending to, discriminating, and interpreting complex or subtle information in their environments. These difficulties are reflected in problems of communication between children with Down syndrome and their caregivers; often parents are induced to talk more and to be more directive than the parents of normal children (Hodapp, 2002). Children with Down syndrome develop more competence when their caregivers provide them with stimulation and encourage them to be attentive to and involved in their environments. Although these efforts are more apt to enhance emotional, social, and motor development than cognitive development, training can help children with Down syndrome learn to read and write (Hodapp, 2002). A number of children with Down syndrome become competent adults who hold jobs and live independently or in group homes. A few people with Down syndrome have become actors and authors.
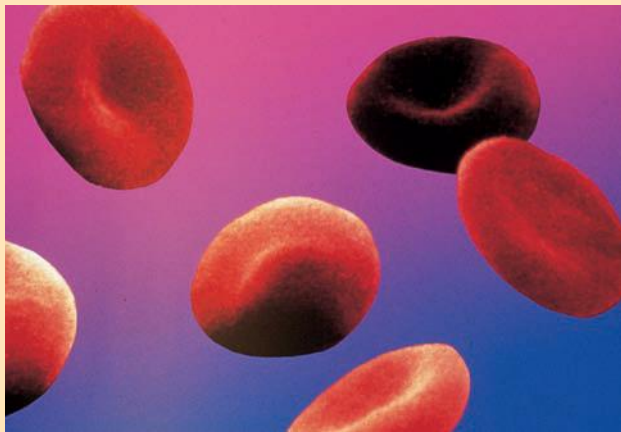
(a)   (b)

Figure 2-6   Red blood cell changes in sickle-cell anemia

Normal red blood cells are disk shaped (a), but in sickle-cell anemia, these cells become sickled, or distorted, when they are low in oxygen (b). Among the symptoms of this disorder are pain in the joints and abdomen, chronic fatigue, and shortness of breath.

of a 4-month-old fetus for a condition called *severe combined immunodeficiency*, however, has made it possible now to think of treating sickle-cell anemia and other immune-deficiency and blood diseases before birth. In this groundbreaking surgery, physicians injected bone marrow cells from the fetus's father into its abdomen by means of a long needle inserted through the mother's abdomen, using ultrasound as a guide (Driscoll, 2007). Nearly a year and a half after his birth, the child was healthy and showed no sign of the rare genetic disease that had threatened his life outside the womb. Another promising treatment involves using a drug to turn on a gene for fetal hemoglobin that is normally dormant after birth. This fetal version of the gene is usually normal and reduces sickling (Atweh et al., 1999).

Maternal Age	Down Syndrome Detected at 9 to 11 Weeks by CVS	Down Syndrome Detected at 16 Weeks by Amniocentesis	Frequency of Down Syndrome among Births
20–24			1/1,400
25–29			1/1,100
30			1/900
35	1/250	1/250	1/385
40	1/80	1/70	1/100
45	1/25	1/25	1/40
Over 45	1/20	1/15	1/25

Table 2-3

Risk of Down syndrome infant, as detected by prenatal tests and at birth, by maternal age

Sources: Gardner & Sutherland, 1996; Hsu, 1998.

Children with Down syndrome can become active, achieving adults. Chris Burke, an actor and a person with Down syndrome, starred in *Life Goes On*, a TV evening sitcom, in which actress Patti Lupone played his mother.

Turner syndrome A form of chromosome abnormality found in females in which secondary sex characteristics develop only if female hormones are administered, and abnormal formation of internal reproductive organs causes permanent sterility.

Klinefelter's syndrome A form of chromosome abnormality in which a male inherits an extra X sex chromosome, resulting in the XXY pattern; many feminine physical characteristics, language deficits, and, sometimes, mental retardation are present.

Sex-Chromosome Anomalies Abnormalities may also arise in the sex chromosomes, where they are rarely fatal to a developing organism but lead to various physical and physiological defects. For example, some females are born with only one X chromosome rather than the normal XX pattern. Usually, this occurs because the father's sperm contained neither an X nor a Y chromosome. Girls with this XO pattern, called **Turner syndrome**, remain short, with stubby fingers, misshapen necks, and unusually shaped mouths and ears. They usually have normal intelligence, and they tend to be docile, pleasant, and not easily upset. As teenagers, they do not develop secondary sex characteristics, such as breasts and pubic hair, unless given female hormones. Because their internal reproductive organs do not develop normally, they remain sterile throughout their lives. Women with Turner syndrome tend to have problems in social relationships because they are immature and lacking in assertiveness (Kesler, 2007). Yet these problems are related in part to others' responses to these women's physical appearance. More important, women with Turner syndrome have difficulty discriminating and interpreting emotional cues and facial expressions in others, skills essential for appropriate social interactions (Kesler, 2007).

Another sex chromosome abnormality found in females is the XXX pattern, in which a girl inherits three X chromosomes instead of the normal two. These *triple-X* girls appear normal physically and have normal secondary sexual development, but their cognitive abilities are affected, especially their short-term memory and verbal skills (Rovet et al., 1996). When a male inherits an extra X chromosome, producing an XXY pattern known as **Klinefelter's syndrome**, he is sterile and has many female characteristics, such as breast development and a rounded, broad-hipped figure. Like the triple-X female, he tends to have verbal language deficits and reading problems and is sometimes mentally disabled (Netley, 1986; Robinson et al., 1992; Simpson et al., 2003). Also likely to suffer some cognitive impairment is the male who inherits an extra Y chromosome; this XYY pattern was once thought to be accompanied by excessive aggressiveness. Although XYY men are generally taller than normal men, they have not been shown to be any more aggressive or violent than others (Burns & Bottino, 1989).

Finally, some people carry an X chromosome that appears to be pinched or narrowed in some areas, causing it to be quite fragile. This **fragile X syndrome** is more frequent in males than females. It accounts for about 5% of mentally disabled males, whose IQ scores range between 30 and 55, although not all males with the syndrome are mentally disabled (Reiss & Hall, 2007). In addition, people with fragile X syndrome often have physical abnormalities and psychological and social problems. Cleft palate, seizures, abnormal EEGs, and disorders of the eyes are some of the more common physical symptoms. Psychological and social problems include anxiety, hyperactivity, attention deficits, and abnormal communication patterns (Garrett et al., 2004). Males may have deficits in social interaction, and females may be more likely to suffer from depression (Reiss & Hall, 2007).

In considering these chromosomal anomalies, it is important to remember that the environment influences the way genes are expressed. The severity of the symptoms that arise from hereditary disorders is often related to the degree to which the person has a supportive environment (Evans & Gray, 2000; Hodapp, 2002). We will return to the topic of how environmental conditions can reduce the effects of genetic abnormalities a little later in this chapter. It is also important to remember that with special therapeutic

and educational methods, some manifestations of these abnormalities may be modified. Recent studies with animals show promise of developing enzyme-inhibiting therapies that may be able to lessen or even reverse the symptoms of fragile X syndrome (Hayashi et al., 2007).

GENETIC COUNSELING AND GENETIC ENGINEERING

Advances in biology and genetics have opened new opportunities for shaping and controlling some aspects of development. For some time now, it has been possible to sample cells from a developing fetus to determine whether the fetus carries genes for any of the disorders we have discussed as well as for many others. With this knowledge, gained through *genetic counseling*, parents may choose either to abort the birth of a child with abnormalities or to prepare for the arrival of such a child, who will need special care. For many people, this is a very difficult choice. For example, ethical and religious beliefs prevent some couples from choosing abortion. In addition, because environmental factors can affect genetic predispositions, we cannot know for sure whether the anomalies we detect will inevitably result in serious problems. For example, although some XYY males engage in criminal activity, such men are relatively few. What would be the ethical implications, then, of a parental decision to abort a fetus with this chromosomal pattern?

More recent advances in the study of genes and their influence have made it possible to offer what we might call preventive genetic counseling. In this type of counseling, couples wanting to have a child can themselves be tested for various defective genes. If they find that they carry defective alleles, they may elect to adopt a child or to conceive a child through one of various *assisted reproductive techniques* in which a donor's egg or sperm may be substituted for one of their own germ cells. These techniques were originally developed to make parenting possible for couples who could not conceive and bear a child of their own. Box 2-2 describes some of the most common of these techniques.

Prenatal Diagnostic Techniques

It is possible that someday we will be able to replace defective genes in a fetus through gene therapy, thus preventing a genetically determined disorder before it happens. Already, physicians have been successful in injecting healthy bone marrow into a fetus to counteract an autoimmune disorder (Anderson, 1995). Before we discuss the exciting new work in this area, however, let us look at the major existing methods for testing the viability and health of a fetus.

COMMONLY USED TESTS The risk of disorder, as in an older expectant mother, may prompt parents to request the testing of a fetus. In **amniocentesis**, the most widely used technique for sampling fetal cells, a physician inserts a needle into the amniotic sac, or the fluid-filled membranous cover that surrounds and protects the fetus, and withdraws a little of the amniotic fluid. This fluid contains cells sloughed off from the fetus (e.g., skin cells), which pathologists can then analyze for their chromosomal and genetic makeup. The 16th week of pregnancy seems optimal for performing amniocentesis. By this time, there are enough cells in the amniotic fluid to draw an adequate sample, yet the fetus is still small enough to avoid injury from the insertion of the needle. Nevertheless, this technique does carry a risk of miscarriage; about 1 woman in 200 to 300 miscarries after this procedure.

fragile X syndrome A form of chromosomal abnormality, more common in males than in females, in which an area near the tip of the X chromosome is narrowed and made fragile due to a failure to condense during cell division. Symptoms include physical, cognitive, and social problems.

amniocentesis A technique for sampling and assessing fetal cells for indications of abnormalities in the developing fetus; performed by inserting a needle through the abdominal wall and into the amniotic sac and withdrawing a small amount of the amniotic fluid.

BOX 2-2

Child Psychology in Action

THE NEW REPRODUCTIVE TECHNOLOGIES

The technique of *in vitro fertilization*—literally, fertilization "in glass" or in a glass dish—is most often used to make childbearing possible for a woman whose fallopian tubes are blocked. Physicians administer hormones to the woman to stimulate ovulation and then remove mature eggs from her ovary. They then place the eggs in a nourishing solution in a glass *petri dish*, where they are mixed with the husband's sperm. If fertilization is successful, the zygote begins to divide, and when it is at the eight-cell stage, approximately 2 to 4 days later, it is inserted into the woman's uterus. For the pregnancy to be successful, the embryo must implant itself in the lining of the uterus. If the woman's uterus is not at the optimum stage to facilitate implantation, the embryo may be frozen and stored until the uterus reaches the proper stage.

In vitro fertilization was a remarkable breakthrough when Louise Joy Brown, the first baby conceived outside of her mother's body, was born in England in 1978. Since then, the techniques have become more common, with 200,000 babies born each year and to date nearly 3 million babies born worldwide using some form of new reproductive technology (de Mouzon, 2006). The technique is used in a variety of situations. For example, when a husband has an insufficient supply of sperm or when the sperm are inadequate, physicians may use a male donor's sperm to fertilize the wife's egg. Or if the woman cannot produce an egg, the husband's sperm may be used to fertilize a female donor's egg, which is then implanted in the wife's uterus. The zygote produced by a husband's sperm and a wife's egg may be implanted in the uterus of a surrogate mother who carries the child to term. Using this technique, in 1991, a woman carried her own grandchild for her daughter, who had been born without a uterus. This feat of becoming a mother and a grandmother at the same time has since been repeated by other women. But the costs of in vitro fertilization are high whether the procedure involves using a woman's own eggs ($12,500 to $25,000) or donor eggs ($20,000 to $35,000). In the United States, insurance will often cover only part of the cost of the procedure, and sometimes, it will not cover these costs at all (American Society for Reproductive Medicine, 2002). However, several other countries such as Great Britain and Canada treat these procedures as part of medical coverage and therefore make these techniques available to individuals regardless of income level (Golombok, 2006).

Like many other medical breakthroughs, these new reproductive technologies have presented some ethical

chorionic villi sampling
A technique for sampling and assessing cells withdrawn from the chorionic villi, projections from the chorion that surrounds the amniotic sac; cells are withdrawn either through a tube inserted into the uterus through the vagina or through a needle inserted through the abdominal wall.

Slightly riskier is **chorionic villi sampling**, which can be done as early as the ninth or tenth week of pregnancy. This procedure carries a slightly higher risk of miscarriage than amniocentesis and involves a slight risk of limb deformities as well. Physicians draw cells from the *chorionic villi*, fingerlike projections from the *chorion*, the outermost membrane that surrounds the amniotic sac. The villi help the zygote to embed itself in the uterine lining and then multiply to form the placenta. Although the villi are not part of the embryo itself, the chromosomes and genes in them are identical to the embryo's because they all arise from the same fertilized egg.

With a prenatal sample of cells in hand, it is possible to examine the fetus's chromosomes and genes for any signs of chromosome disorder. The critical abnormalities (e.g., missing or extra chromosomes) are clearly visible under a high-powered microscope. In addition, scientists have identified particular pieces of DNA, called genetic markers, that can serve as indicators of many disorders caused by one or more defective genes. For example, the gene for cystic fibrosis has been located on the midsection of chromosome 7, and a gene for familial Alzheimer's disease is found on the long arm of chromosome 21 (Lander, 1996). The latter discovery may in part account for the fact that individuals with Down syndrome, as we've already noted, face a greater chance of developing Alzheimer's disease, for they have an extra chromosome 21. Without further research, however, we cannot be certain of this connection. Discovery of a birth defect, of course, raises the ethical issue of whether or not to abort the pregnancy—again a difficult personal decision for the couple.

As part of an in vitro fertilization procedure, a technician inserts a human sperm cell into an egg in a petri dish.

might such parents have? What legal rights does a male donor have? What legal rights to the child does a woman have who has agreed to be a surrogate mother for another couple? With regard to surrogacy, there have been several celebrated cases in recent years in which the surrogate mother changed her mind about relinquishing custody. In one Massachusetts case—*Roscoe* (contracting parents) v. *Hoagland* (surrogate mother)—the court ruled in favor of the contracting parents, awarding them custody of the infant, even though the surrogate had decided to keep the baby (Blomeke, 1999).

Another major issue deals with the fate of frozen embryos. Can "extra" embryos be used for stem cell research? Embryos can be split and thereby cloned; should this technology be allowed? What would parents expect from identical twins born years apart? In the United States, the stem cell research debate continues, although in some countries—for example, Great Britain—the use of nonfertilized embryos for medical research is permitted. In spite of these difficult questions, the hope, joy, and prospect of parenthood that the new reproductive techniques have given to many couples formerly unable to conceive or bear children seem to outweigh other considerations.

dilemmas (Parke et al., 2008; Schwartz, 2003; Shanley, 2001). How should prospective parents be screened? What criteria should be used in selecting sperm donors and in matching sperm to eggs? For example, should parents be offered sperm from a Nobel prize winner? (A bank of such sperm was actually started some years ago.) What possibly unrealistic expectations

One of the more personal hunts for a genetic marker was led by neuropsychologist Nancy Wexler, whose mother died of **Huntington disease**, a fatal deterioration of the nervous system that begins in midadulthood, one that Wexler had a 50% chance of inheriting. Wexler charted patterns of Huntington disease in 5,000 Venezuelans who were all descendants of a woman who died of the disease more than 100 years ago. By using DNA samples from living relatives who had the disorder, Wexler and geneticist James Gusella (Gusella et al., 1983) were able to identify a Huntington marker on chromosome 4. This discovery made it possible to develop a test for the Huntington gene. Recent work with animals suggests that new drugs may prevent the deterioration of cells associated with this disease (Tang et al., 2007).

Two other prenatal tests are now routinely done for most pregnancies, not just in cases of suspected risk based on family history. The **alphafetoprotein (AFP) assay** is a maternal blood test that can reveal the potential risk of certain fetal problems such as Down syndrome or defects of the central nervous system, as well as the presence of multiple embryos. If the test does uncover possible difficulties, parents in consultation with their physicians can undertake further tests. However, this is a conservative test with a high rate of false positives—that is, cases in which the test indicates that there may be a problem when none, in fact, exists. **Ultrasound**, or ultrasonography, a method of visualizing deep body structures, is now commonly used to detect gross physical abnormalities in a fetus. The technique, which scans the uterus by means of sound waves, produces a sonogram, or film, that shows the size and structure of the developing fetus

Huntington disease A genetically caused, fatal disorder of the nervous system that begins in midadulthood and is manifested chiefly in uncontrollable spasmodic movements of the body and limbs and eventual mental deterioration.

alphafetoprotein (AFP) assay A maternal blood test performed prenatally to detect such problems as Down syndrome, the presence of multiple embryos, and defects of the central nervous system.

ultrasound A technique that uses sound waves to visualize deep body structures; commonly used to reveal the size and structure of a developing fetus. Also called ultrasonography.

BABECO
FERTILITY
RESEARCH

REMEMBER WHEN WE
JUST DELIVERED THE
BABIES?...

Source: SPEED BUMP. By permission of
Dave Coverly and Creators Syndicate, Inc.

and can determine the baby's sex. Ultrasound has other benefits as well. The opportunity to observe that the developing fetus appears healthy and normal probably reduces parents' anxieties. Finally, unlike amniocentesis or chorionic villi sampling, neither the AFP nor ultrasound increases the risk of miscarriage.

ETHICAL AND POLICY ISSUES   When prenatal testing reveals some major chromosomal or genetic abnormality in an unborn child, parents have the option of aborting the pregnancy. But this raises the ethical dilemma of deciding when an abnormality is severe enough to warrant an abortion. If a fetus has a lethal genetic disorder that will lead to a painful death in a few months or years, the choice is often easier than if the disorder is less devastating. What about a female fetus with Turner's syndrome, the XO chromosome pattern, or a male with the XXY pattern that gives rise to Klinefelter's syndrome? Although these children have both physical abnormalities and some cognitive impairments, they are capable of leading very productive lives. Confronting prospective parents with such difficult ethical choices is one result of developing the new technology to analyze chromosomes and genes (Murray, 1996). Even nongenetic testing, like ultrasound, is associated with some ethical problems. For example, in cultures where male children are preferred over females, this kind of prenatal assessment could lead to an increase in the rate of abortion for female fetuses (Murray, 1996; Shanley, 2001).

The new availability of genetic information also raises issues of ethics and policy in such areas as employment and personal insurance and among people who oppose abortion (Plomin & Rutter, 1998). For example, employers might decide to require in-depth genetic screening for potential employees and reject individuals who have a gene that may someday put them at risk for cancer, heart trouble, or other diseases. Recent legislation in the United States (Genetic Information Nondiscrimination Act of 2007) is aimed at preventing discrimination against individuals based on their genetic information. Some writers have even suggested that certain industries might try to select employees for their lower likelihood of being affected by exposure to chemical toxins and then fail to institute necessary procedures to protect employees. Equally disturbing is the possibility that insurance companies might decide to use information about the genetic risks people may have for certain diseases to exclude such individuals from insurance protection or to adjust rates for insurance coverage (Kass, 2002; Murray, 1996). Finally, religious and social groups are concerned about the rising rate of abortion owing to the increased use of genetic screening. The prevalence of these potential abuses is unclear at this point, but the best way to develop guidelines for addressing such dilemmas may be to heighten public awareness of these issues (Bentley, 1996).

Gene Therapy

Scientists hope not only to locate the genes responsible for inherited disorders but also to use gene therapy to ameliorate or even cure these problems. Gene therapy involves inserting normal alleles into patients' cells to compensate for defective alleles. The most effective current technique uses modified viruses (viruses from which harmful properties have been removed) to carry the new genes into the patient's cells. Scientists

have adopted this strategy because viruses are by nature adapted to penetrate another organism's cells. Most often, target cells in the patient are first removed from the person's body, infused with the new gene by way of the virus, and then returned to the body. With federal approval, this procedure was first used in 1990 in treating a 4-year-old girl who had a deadly genetic disorder that shut down her immune system, leaving her defenseless against infections. Doctors inserted into some of the child's blood the gene needed to produce a critical enzyme that her immune system lacked. Ten years later, she continued to do well with some additional medication (Thompson, 2000). French scientists have also had some success with gene therapy for immune deficiencies (Fischer et al., 2001).

Not all the news about gene therapy has been good. Few effective treatments have been found despite more than 400 clinical trials. More ominously, patient deaths have been associated with some trials.

It may take some time before gene therapy is perfected, but much information has been gathered to assist scientists in their work. Box 2-3 describes the work of the Human Genome Project, whose aim was to map the identities and locations of all human genes in the hope of being able to prevent or treat more than 4,000 diseases to which our genes make some of us susceptible.

But again, as science enters this new age of genetic engineering, we confront significant ethical issues (Kass, 2002; Murray, 1996). As greater genetic manipulation becomes possible, how should we use it? It is one thing to replace a defective allele in a person who is seriously ill but quite another to attempt to use gene therapy for performance or appearance enhancement or to create a race of superhumans (Kiuru & Crystal, 2008). Even more troublesome to many is our newfound ability to clone living creatures. The potential benefits of many of our new technologies are great, but the dangers of using them unwisely may be even greater.

HEREDITY-ENVIRONMENT INTERACTIONS

In the past, many scientists took up opposing positions on what was familiarly referred to as the nature-nurture issue. Scholars who were more biologically oriented emphasized the role of heredity and maturational factors in human development, whereas those who were more environmentally oriented emphasized the role of learning and experience. In the United States, where political and social philosophy stressed the importance of opportunity, education, and initiative, theories of biological determinism was less popular, and the environmentalist position of John B. Watson and the behaviorists flourished. In 1926, in the heat of the nature-nurture debate, Watson boasted:

> Give me a dozen healthy infants, well-formed, and my own specific world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—a doctor, lawyer, artist, merchant-chief and, yes, even into beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors. (1926, p. 10)

Contemporary psychologists, both in the United States and in other countries, see neither nature nor nurture as wholly responsible for the development of a human being. Instead, scholars focus today on how heredity and environment constantly interact to shape the developing person. Although they see genetic endowment as to some extent limiting what a person can become and do, most psychologists believe that social and environmental experiences exert a tremendous influence on the developing child. Moreover, they see gene-environment interactions as highly complex. Not only do environments influence how genes are expressed, but genes can also help shape the environments to which people are exposed. We will explore both sides of this complex story.

BOX 2-3

Child Psychology in Action

THE HUMAN GENOME PROJECT

The Human Genome Project (HGP) is an international cooperative scientific endeavor, funded by both private and public dollars, the aim of which is to locate all the genes of the human genome and then to sequence all human chromosomes (list the actual base pairs) accurately. The U.S. Congress authorized funding in 1988, and mapping and sequencing were completed in 2003 (International Human Genome Sequencing Consortium, 2004). Due to public and private lab cooperation and improved technology, the work was completed ahead of schedule. The final version of the human genome contains an estimated 20,000–25,000 human protein-coding genes, about 15,000 genes fewer than previously predicted (Venter et al., 2001). Recently, Craig Venter published his complete DNA sequence, the first time that the full 6 billion letter genome of a single individual has been available (Levy et al., 2007). It is likely that similar information about others will be available soon, and in the future, as costs go down, many of us will know our own genomic information.

Consider this description of the cataloging of the human genome:

> Some geneticists compare these segments (of genes) to books on a library shelf and for chromosomes 21 and Y, all the books now shelved are in the correct order. Researchers still can't decipher the locations or meanings of most phrases (genes) and letters (nucleotide sequences) within these volumes. At least, though, once an experimenter does discover which large segment contains a gene or base sequence of interest, he or she gets it straight off the "library shelf." (Postlethwait & Hopson, 1995, p. 281)

Work is also being done on animal genomes to increase our basic knowledge and to help provide more accurate models for the study and treatment of human diseases and conditions (NIH, 2002; U.S. Department of Energy, 2002). Work that compares the human genome sequences with animal genome sequences has given scientists some insights into the birth and death of genes in the human genome. More than 1,000 new genes arose in the human genome after our divergence from rodents some 75 million years ago. For example, there are two families of new genes in the human genome that encode sets of proteins that may be involved in the extended period of pregnancy unique to humans. Similarly, other genes have died or stopped functioning, such as those involved in olfactory or smell reception. This may account for humans having a poorer sense of smell than rodents.

The implications of the HGP are sweeping. Not only will it give us insight into the basic workings of the human body, but it will also provide us with important insights into genetic diseases, such as sickle-cell anemia, Huntington disease, Turner syndrome, and Williams syndrome. These and several hundred other diseases are carried on single genes, but most illnesses, such as cancer or heart disease, are determined by interactions among multiple genes; figuring out the origins of most genetically caused illnesses will be a truly daunting task (Benson, 2004; Plomin et al., 2002). Despite the incredible scope of their assignment, researchers have made progress in identifying genes that may, in part, account for diseases such as Lou Gehrig's disease, some forms of Alzheimer's dis-

How the Environment Influences the Expression of Genes

range of reaction The notion that the human being's genetic makeup establishes a range of possible developmental outcomes, within which environmental forces largely determine how the person actually develops.

The concept of **range of reaction** helps explain how environments influence genes (Gottesman, 1963; Plomin, 1995). According to this concept, heredity does not rigidly fix behavior but instead establishes a range of possible developmental outcomes that may occur in response to different environments. As you might expect, individuals with different genetic makeups also have different ranges of reaction; their particular sets of genes set boundaries on their range of developmental possibilities. Of course, some traits such as eye color are determined by genes, but for the complex behaviors that concern child developmentalists, models that stress the interplay between genes and environment are more useful. And within those boundaries, the environment largely determines how the person will develop.

A geneticist examines a computer display of a DNA sequencing pattern. These patterns are used to write the human genetic codes for protein production and for various structural and functional characteristics that are transmitted from generation to generation.

ease, epilepsy, and even cardiovascular disease and resistance to HIV (Lander, 1996). New insights into the genetic origin of disease may lead to new therapeutic procedures.

Finally, this information is shedding new light on the interplay between genes and the environment as well. Caspi and his colleagues (2002; 2003; Moffitt & Caspi, 2006) have studied a gene identified through HGP that affects the breakdown and uptake of neurotransmitters in the brain. Interestingly, these pioneering researchers discovered that although this gene has effects on antisocial behavior, these effects are seen only in people exposed to abuse during childhood. Once again, we are reminded that genes do not act alone; their impact on human behavior depends on the particular environmental factors that also affect the individual.

As with genetic testing, there are ethical concerns about how doctors, employers, and insurance companies will use the data and about possible abuses of the new genetic information (Lowrance & Collins, 2007). For example, even if scientists determine that a person is genetically prone to develop a disease, he may never do so; as a result, caution in the use of this information is critical.

Not all are as wary as others. As James Watson, a Nobel prize winner, argued, "When finally interpreted, the genetic message encoded within our DNA molecules will provide the ultimate answers to the chemical underpinnings of human existence" (Postlethwait & Hopson, 1995, p. 281).

A good example of the interaction between range of reaction and the environment is provided by the hypothetical example in Figure 2-7. Each of the three children represented by curves A, B, and C has a different range of possible scores on an achievement test. If all three children experience exactly the same level of environmental stimulation, child C will always outperform the other two. However, child B could achieve a substantially higher score than C if B experiences a more enriched environment than C does. (An enriched environment may have a high level of physical and mental stimulation, such as a wide array of toys and books; social-emotional stimulation, such as the presence of highly responsive and attentive caregivers; or social-cognitive-linguistic stimulation, such as caregivers who talk and read a lot to a child.) Notice, too, that child C has the widest range of reaction; that is, the difference between child C's potential performance in either restricted or enriched environments is much greater than the analogous difference for child B and child A. Child A has both the lowest and the most limited range of reaction. This child not only scores below average (50) whether raised

Figure 2-7

Interaction between environment and genotype

Providing any child with an enriched, stimulating environment can substantially improve the child's performance on various measures of achievement. However, each child's genotype—in this hypothetical illustration, the genotypes are represented by the labels Child A, Child B, and Child C—will determine the limits within which his or her performance may vary.

Source: Adapted from Gottesman, 1963.

canalization The genetic restriction of a phenotype to a small number of developmental outcomes, permitting environmental influences to play only a small role in these outcomes.
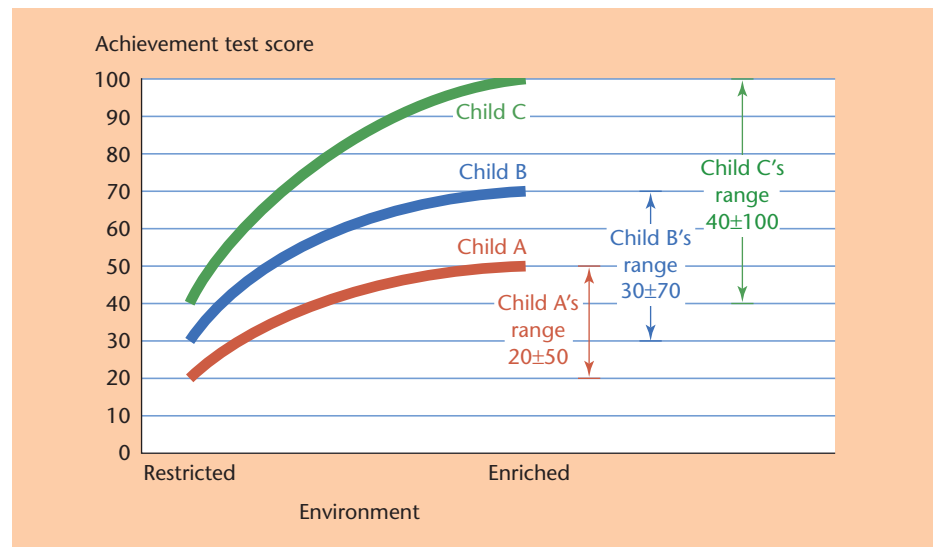
in a stimulating or unstimulating setting but also shows less ability to respond to an environmental enrichment.

When a reaction range for a trait is extremely narrow, even narrower than child A's, it is said to show strong **canalization** (Waddington, 1962, 1966). The development of a highly canalized trait is restricted to just a few pathways, and more intense or more specific environmental pushes are required to alter the course of development. For example, a baby's tendency to repetitively utter consonant-vowel combinations (called *babbling*) is strongly canalized because babbling occurs even in babies who are born deaf and have never heard a human voice (Lenneberg, 1967). In contrast, intelligence is less highly canalized, for it can be modified by a variety of physical, social, and educational experiences.

Gilbert Gottlieb (1991, 1992; Gottlieb & Lickliter, 2004) has offered a view of gene-environment interaction in which genes play a less determinative role in shaping development. Gottlieb argues that individual development is organized into multiple levels—genetic activity, neural activity (activity of the nervous system), behavior, and environment—all of which influence each other. As Figure 2-8 shows, this influence is bidirectional; that is, it is directed both from bottom to top and from top to bottom. Consequently, genes and environment mutually influence each other; for example, the prenatal environment could alter the expression of the genes, and the postnatal environment could, in part, determine whether a genetic predisposition found full expression in behavior. Thus, although each of the figure's levels generally influences the level directly above or below it, other interactions across nonadjacent levels are possible. In his work on mallard ducklings, Gottlieb found that ducklings' usual preference for the sounds of other ducks—a genetically governed preference—could be modified if the duckling were exposed before birth to sounds made by chickens. The duckling exposed to chicken sounds preferred these sounds to duck sounds.

The most important point of this view is the recognition that genes are part of an overall system and that their activity—that is, the expression of the characteristics they carry—is affected by events at other levels of the system, including the organism's environment. The message is clear: Both genes and environment are inextricably linked and always operate in a mutually dependent fashion in shaping development. It is impossible to treat genes and environment as truly separable, for both need to be considered together.

Another factor in gene-environment interaction is the stage of the child's development. Both developmental stage and the environment determine the likelihood that a genetically based trait or characteristic will be influenced by environmental forces. For example, as we discuss further in Chapter 3, if a fetus is exposed early in its develop-

Figure 2-8

Environment
(Physical, Social, Cultural)

Behavior

Neural activity

Genetic activity
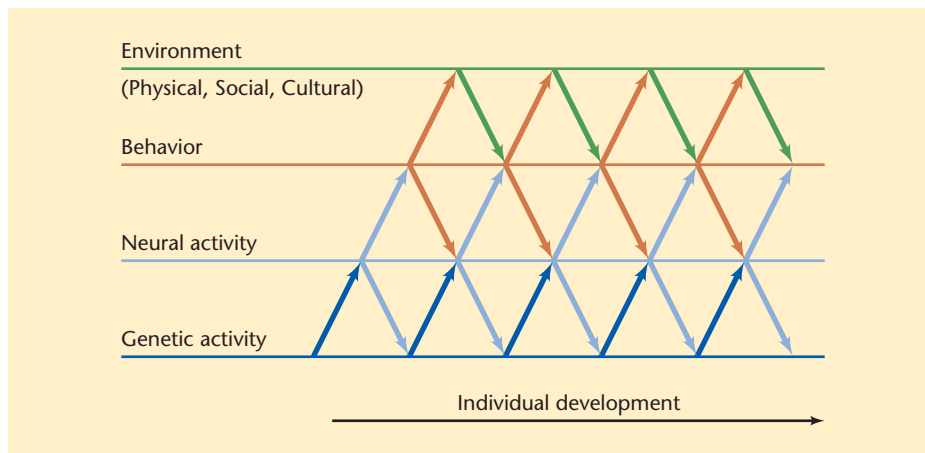
Individual development

Bidirectional influence in gene-environment interactions

In the developmental systems view, the influence each of the four levels of individual development wields is bidirectional; that is, each level influences both the one above and the one below it. Any level may also influence non-adjacent levels.

Source: Gottlieb, 1992.

ment to the virus that causes German measles, the child is very likely to have some damage to its hearing. After the third month of pregnancy, however, fetal exposure to this virus generally does not affect the child's hearing. The window of opportunity for this particular environmental influence has largely closed because the fetus has reached a more mature stage of development.

Another example of the importance of critical periods can be seen in the treatment for PKU, the genetic disorder we discussed earlier. Babies today are routinely tested for PKU, and if they are found to be homozygous for the trait, they are placed on a special diet low in phenylalanine to prevent the buildup of toxins that results in mental retardation. In Figure 2-9, we see once again that in the interaction between genotype and environment, there is a window of opportunity. The special PKU diet must begin immediately after birth, for delays of even a few months can have devastating effects on a child's intellectual development. On the other hand, if this diet begins at once and continues until the nervous system is mature, a child with PKU can develop intellectual abilities close to normal. Whether a child must stay on this diet indefinitely is a matter of controversy; at present, most experts recommend that women with PKU, at least, remain on it for life if they plan to bear children. If they don't do this, they may have to go back on the diet during pregnancy; if they fail to do this early enough, they may miscarry or the fetus may develop mental retardation (Verp, 1993). This example illustrates not only the importance of the timing of environmental influences but also the complex way in which developmental outcomes—even those involving a genetically based predisposition—arise from the interaction between genes and environment.

Figure 2-9

Maximum IQ score attained

90
80
70
60
50
40
30
20
10
0

1–13   27–39   53–65   79–91   105–117 131–143   157+

Age at which treatment began (in weeks)
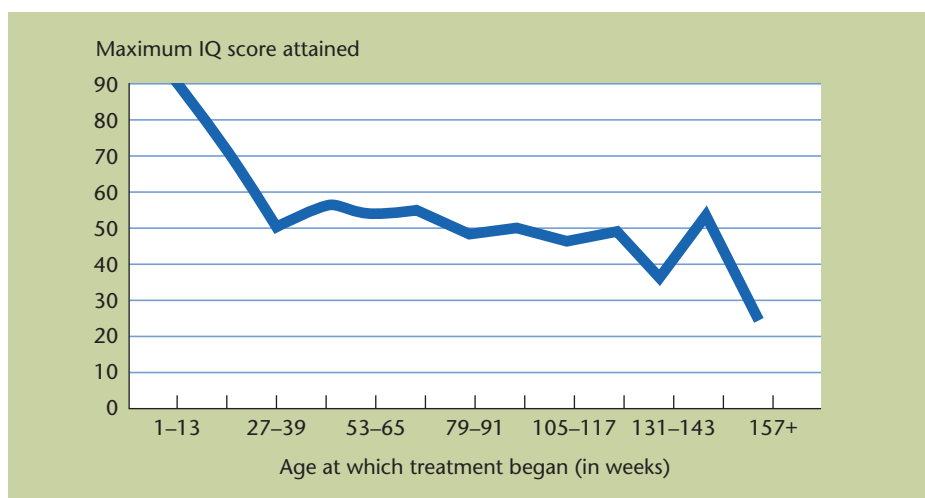
Diet and intelligence in PKU children

Clearly, delaying the age at which a special diet begins for the child born with phenylketonuria can have seriously negative effects on the child's intellectual functioning. If the diet begins at birth, however, the child can eventually achieve an IQ score close to average (which would be 100; see Chapter 10).

Source: Adapted from Baumeister, 1967.

As children develop and have more freedom to choose companions and contexts, they may, in what is called niche picking, select activities compatible with their genetic predispositions. They give expression to these predispositions by choosing endeavors that support them.

passive genetic-environmental interaction The interactive environment created by parents with particular genetic predispositions who encourage the expression of these tendencies in their children.

evocative genetic-environmental interaction The expression of the genes' influence on the environment through an individual's inherited tendencies to evoke certain environmental responses; for example, a child's smiling may elicit smiles from others.

How Genetic Makeup Helps to Shape Environment

It is now widely accepted that the environment influences gene expression. However, the idea that the environment can be shaped by genes is relatively new and is less commonly acknowledged. Scientists have proposed several ways in which people's genetic makeup can influence their environments (Moffitt & Caspi, 2006; Rutter, 2006; Scarr, 1996). In one of these pathways, known as the **passive genetic-environmental interaction**, parents with certain genetic predispositions may create a home environment that suits those predispositions and that may also suit and encourage the inherited predispositions of their children. Intelligent, well-educated parents may provide a home with books and stimulating conversation, enhancing their children's inherited tendencies to be bright and encouraging them to learn. In another pathway, known as the **evocative genetic-environmental interaction**, genes can influence the environment through people's inherited tendencies to evoke certain responses from others—that is, from their social environment. For instance, babies with an inborn tendency to smile often will probably elicit more positive stimulation from others than do very somber, unresponsive infants (La Freniere, 2000; Plomin, 1995). In this paradigm, the environment that has been altered by genetic expression has reciprocal effects on genetic makeup: The evoked stimulation reinforces the babies' smiling and ultimately, by a circular process, tends to magnify the babies' genetic predisposition (see Chapter 6).

Finally, genes can influence environment in a third way—namely, through an **active genetic-environmental interaction**. People's genetic makeup may encourage them to actually seek out experiences compatible with their inherited tendencies (Scarr, 1996; Scarr & McCartney, 1983). In a process called **niche picking**, people search for, select, or build environments or niches compatible with their predispositions. Thus, people genetically predisposed to be extroverted or gregarious actively seek the company of other people and become involved in a wide range of social activities. Or perhaps aggressive children are more likely to sign up for martial arts classes than a chess club (Bullock & Merrill, 1980). These experiences, in turn, enhance the expression of their genes for aggression. The importance of niche picking probably increases from childhood to adolescence and adulthood, as people gain more freedom to choose their activities and companions.

These influences of genes on environment underscore the difficulty of determining the relative contributions of heredity and environment to individual differences in development. If genes influence environmental experiences, which in turn influence genes, it is difficult to separate the factors involved in these complex feedback loops. In fact, most view the issue as a search for how genes and environment operate together in shaping development rather than assigning responsibility to one or the other source (Rutter, 2006). As we will see in the next section, researchers have attempted to demonstrate the influence of both heredity and environment on individual differences in a large number of characteristics.

HEREDITY, ENVIRONMENT, AND INDIVIDUAL DIFFERENCES

An important question is why people develop in such widely different ways. Why, for example, does one child achieve an IQ score of 105, whereas his sister has a score of

150? Why is one child so outgoing and sociable, and another more introverted and shy? How can we explain why some children and adults are chronically aggressive, whereas others seek to cooperate and avoid confrontation? For years, psychologists interested in human personality have struggled with questions like these. The field of **human behavior genetics** arose in the 1960s when some scientists began to focus their attention particularly on the relative contributions that heredity and environment make to the array of individual differences observed in human behavior (Plomin et al., 2001; Rutter, 2006).

Unlike biologists who study heredity, behavior geneticists can conduct their research without ever directly measuring chromosomes, DNA, or genes. Instead, using sophisticated statistical techniques, they calculate what are called **heritability factors**, or percentage estimates of the contribution that heredity makes to a particular ability or type of behavior. When discussing heritability factors, a caution is in order: These percentage contributions of heredity to individual differences should not be viewed as applicable to all groups of children or adults at all points in development. The relative contribution of heredity to an observed difference in human behavior depends on how wide a range of environmental influences the people being studied have been exposed to. For example, when children experience virtually the same environment, we may assume that heredity plays the greater role in any individual differences in their behaviors. When environments are extremely different, however, things get more complex: Whereas environmental factors may exert a greater influence on people's behavior, their very abundance may sometimes obscure the genetic influences at work.

British psychiatrist Sir Michael Rutter (1992, 2006) argues that people have many misconceptions about what the study of genetics contributes to our knowledge of human development (see Table 2-4). According to Rutter, the field of behavior genetics has as much to say about environmental influences on human beings as it has to say about genetic effects on humans. With the right research strategies, Rutter claims, it is possible not only to reveal the interaction between these two forces but also to distinguish between them and to estimate the extent to which each contributes to any given trait or ability.

active genetic-environmental interaction A kind of interaction in which people's genes encourage them to seek out experiences compatible with their inherited tendencies.

niche picking Seeking out or creating environments compatible with one's genetically based predispositions

human behavior genetics The study of the relative influences of heredity and environment on the evolution of individual differences in traits and abilities.

heritability factor A statistical estimate of the contribution heredity makes to a particular trait or ability.

- **Genes limit potential.** Wrong. Genetic factors do affect potential, but that potential is affected in turn by a child's environment. Change the environment, and the potential changes, too.
- **Strong genetic effects mean that environmental influences are not important.** Wrong. Although genetic effects account for individual variability, the environment may affect changes in the average expression of a characteristic. For example, the range of individual differences in IQ of children from disadvantaged families who are adopted into more advantaged families is more closely related to the IQ range of the children's biological parents. Nevertheless, these children show a general rise in IQ levels, demonstrating the effects of a stimulating environment.
- **Nature and nurture are separate.** Wrong. Both genes and environment are necessary for an individual to develop: "No genes, no organism; no environment, no organism" (Scarr & Weinberg, 1983, p. 265).
- **Genetic influences diminish with age.** Wrong. The relation between genes and aging is highly complex. Some hereditary characteristics are most evident in early stages of development; some are more evident in later stages. For example, the age at which puberty occurs is largely under genetic control, whereas the contribution of genetic factors to individual differences in intelligence is more evident in older than in younger children.
- **Genes regulate only static characteristics.** Wrong. Genes affect developmental change as well. Deviations in the normally expected environment can upset the timetable for the child's physical and psychological development, producing gross delay. However, the time at which particular characteristics emerge and the sequence in which they appear are determined primarily by the child's genetic makeup.

Sources: Rutter, 1992, 2006; Shaffer, 1996.

Table 2-4

Some misconceptions about the study of behavior genetics

Methods of Studying Individual Differences

The method used most often to investigate the contributions of heredity and environment to individual differences is the study of family members whose degrees of biological relatedness are known. Studies of this type generally compare adopted children with their biological and adoptive parents, examine similarities and differences between fraternal and identical twins, or explore the effects of similar and different environments on twins and on ordinary siblings (Plomin et al., 2001; Rutter, 2006).

ADOPTION AND TWIN STUDIES　In adoption studies, researchers usually compare characteristics of adopted children with those of both their adoptive and biological parents. Although the adoptive parents exert environmental influences on their adopted children, investigators can assume that there is no genetically determined similarity between these adoptive parents and their children. Adopted children, of course, have genes in common with their biological parents, but the latter exert no postnatal environmental influences on the children. (These kinds of studies include only adopted children who have no contact with their biological parents.) Based on these assumptions and conditions, researchers reason that any similarity of adopted children to their adoptive parents must be due to their social environment, whereas any similarity of the children to their biological parents must be the result of similar genetic makeup (Moffitt & Caspi, 2006; Rutter, 2006). Adoption studies sometimes investigate the similarities and differences between biological siblings and adopted children who live in the same home. To cite one example, researchers have found that a biological parent's educational level is a better predictor of an adopted child's intelligence test scores than is similar information about the child's adoptive parents (Scarr & Weinberg, 1983). This suggests that genetic factors make an important contribution to intelligence.

In twin studies, researchers take a different approach to uncovering the contributions of heredity and environment to human differences. Often, these studies involve comparing the similarities between identical and fraternal twins raised together in the same home. Identical, or **monozygotic**, twins are created when a single zygote splits in half and each half becomes a distinct embryo with exactly the same genes; both embryos come from one zygote (mono means "one"). In contrast, fraternal, or **dizygotic**, twins develop from two different eggs that have been fertilized by two different sperm, producing two different zygotes (di means "two").

Because they are conceived independently of each other, fraternal twins are no more similar genetically than any other pair of siblings; on average, they have half their genes in common. When comparing sets of identical and fraternal twins, researchers assume that each set has been raised in essentially the same type of environment. Thus, if identical twins show more resemblance on a particular trait than fraternal twins do, we can assume that the resemblance is strongly influenced by genes. We will see many examples in later chapters of the greater resemblance of identical twins compared with fraternal twins on such characteristics as IQ, altruism, and aggression (see Chapters 10 and 14). On the other hand, if on a given trait the two kinds of twins resemble each other almost equally, we can assume that the resemblance is strongly influenced by the environment.

SHARED AND NONSHARED ENVIRONMENTS　Is it legitimate to make these assumptions? Some investigators have questioned the proposition that each member of a twin pair experiences the same environmental conditions. These investigators argue that identical twins, because of their identical genes and inherited predispositions, are treated more similarly by their parents, evoke more similar responses from people outside the family, and select more similar settings, companions, and activities than do fraternal twins (Scarr, 1996; Scarr & McCartney, 1983). Thus, these critics claim, identical twins have more **shared environments** than fraternal twins, and so

---

monozygotic Characterizing *identical* twins, who have developed from a single fertilized egg.

dizygotic Characterizing *fraternal* twins, who have developed from two separate fertilized eggs.

shared environment A set of conditions or experiences shared by children raised in the same family; a parameter commonly examined in studies of individual differences.

any similarities in their traits must be attributed to both the environment and their genetic makeup (Rutter, 2006). Fraternal twins and siblings, they suggest, have more **nonshared environments**, or separate experiences and activities.

This viewpoint stresses that people are active creators of their own environments, not just passive recipients of environmental influences. In both deliberate and unintentional ways, people help to shape the many experiences they're exposed to. With this in mind, consider whether two siblings who live together in the same home encounter exactly the same family environment (Dunn & Plomin, 1991; Feinberg & Hetherington, 2001). In fact, there are differences in people's experiences even within the same setting, differences based in part on who the people are as individuals. This perspective helps explain why adoptive siblings, and even biologically related ones, often show only a modest similarity on behavioral traits. Moreover, the initially modest similarity caused by a shared childhood home tends to decline with age, as personal niche picking exerts more and more influence on people's behavior (Reiss et al., 2000; Towers et al., 2003).

Children raised in the same family, then, have both shared and nonshared experiences. Shared conditions would include such factors as being poor or well off, living in a good or a bad neighborhood, and having parents who are employed or unemployed, in good health or physically or mentally ill (Reiss et al., 2000; Towers et al., 2003). Experiences not shared, in contrast, would include factors or events related to the individual characteristics of a particular child; for example, what specific activities that child engages in or how he or she is treated because of age, gender, temperament, illness, or physical and cognitive abilities. Studies show that siblings, even twins, have many nonshared experiences that affect their development (Plomin, 1995; Plomin & Daniels, 1987). Even small differences in nonshared experiences may cause differences in how siblings develop. Furthermore, siblings' perceptions that their experiences—for example, the way their parents treat them—are different can affect their behavior whether or not these perceptions are accurate. In fact, some argue that nonshared influences are more important for understanding development than shared influences (Plomin et al., 2001). Increasingly, researchers are designing studies in which two siblings in the same family are examined rather than single siblings from different families to better evaluate the influence of nonshared versus shared environmental experiences (McGuire, 2001; Rutter, 2006). Clearly, researchers can no longer assume a homogeneous home environment for all siblings; be alert to this fact when you read the reports and conclusions of such studies.

Some Individual Differences and Their Contributors

In this section, we have chosen to look at some of the findings of behavior genetic research in two important areas. We begin by examining the effects of heredity and environment on differences in intellectual abilities and we then explore differences in temperament and personality.

INTELLECTUAL CHARACTERISTICS   Interestingly, studies comparing the intelligence quotient, or IQ, scores of twins have been remarkably consistent in their findings (we discuss intelligence at length in Chapter 10). This research indicates that genes heavily influence similarities and differences in individual performance on intelligence tests. Generally, the closer the genetic links between two people, the more similar their IQ scores. As you can see from Table 2-5, which summarizes more than 100 family resemblance studies of twins, siblings, and other relatives, identical twins reared in the same household are most similar in IQ scores (+.86 is a very high, positive correlation). The least similar in IQ scores are cousins, who have relatively few

nonshared environment A set of conditions or activities experienced by one child in a family but not shared with another child in the same family.

Relationship of Family Members	Correlation Between IQ Scores
Identical twins reared together	.86
Identical twins reared apart	.79
Fraternal twins reared together	.60
Siblings reared together	.47
Parent and child	.40
Foster parent and child	.31
Siblings reared apart	.24
Cousins	.15

* Correlations are compiled from 111 different studies from all parts of the world. In general, the closer the genetic relationship of two people, the higher the correlation between their IQ scores.

genes in common and are not raised in the same home (only +.15). As genetic similarity decreases, so does similarity in intelligence scores. Even identical twins raised apart have IQ scores that are more similar than are those of fraternal twins raised in the same home. Furthermore, although twin correlations of IQ decrease with age as the influence of a shared family environment diminishes, that decrease is greater for fraternal than for identical twins (McCartney et al., 1990).

Genes contribute not only to differences in general intellectual performance but also to differences in specific mental abilities, some more so than others. Differences in spatial and verbal abilities, for instance, are more influenced by genetic factors than are differences in memory and perceptual speed (Plomin, 1990). In a surprising finding, however, differences in creativity, that aspect of cognitive behavior that includes scientific and artistic innovation, show less genetic influence than differences in any other specific cognitive ability. It looks as if creative geniuses are largely made, not born!

Heredity affects not just differences in the level of mental development but also differences in the timing and rate of development. Just as children show spurts and plateaus in physical growth, they also show variations in the rate and timing of mental growth. Heredity apparently contributes substantially to these individual differences, as suggested by the fact that identical twins are more similar in this regard than fraternal twins (Wilson, 1983). For example, Figure 2-10 shows how the scores achieved by two sets of identical twins on infant intelligence tests rose and fell in much the same patterns over their first 2 years. Tests of infants typically show wide fluctuations over time; what is remarkable here is how similar the patterns of the fluctuations were for each pair of twins.

Figure 2-10

Twins' intelligence test scores over the first 2 years

The members of each of these two sets of identical twins paralleled each other closely in intelligence test scores as they developed over a period of about 2 years.

Source: Adapted from Wilson & Harpring, 1972.
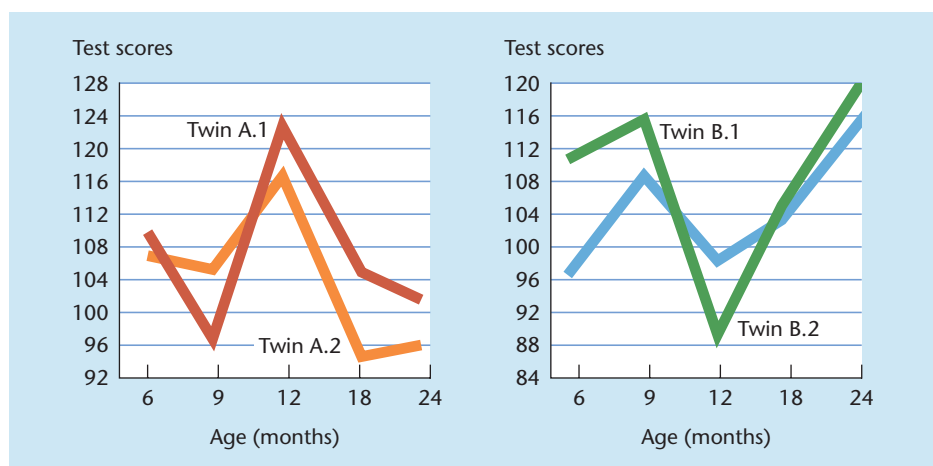
Adoption studies also reveal significant genetic contributions to individual differences in intellectual development (Plomin et al., 2001; Rutter, 2006). Even if children have been adopted in their first year of life, their intellectual performance at school age correlates more closely with their biological parents' intelligence ratings or scores than with those of their adoptive parents; moreover, the correlation with foster or adoptive parents declines with age (Scarr & Weinberg, 1983).

Bear in mind that the results of adoption studies do not mean adoptive parents fail to influence their adopted children's intellectual performance (Turkheimer, 2000). In one classic adoption study, adopted children were found to have IQ scores that averaged 20 or more IQ points higher than the IQ scores of their biological mothers (Skodak & Skeels, 1949). Because the adoptive parents in this study tended to be more highly educated and more socially and economically advantaged than the biological parents, this result was probably due to the more stimulating home environments that the adoptive parents provided. But note also that, despite this environmental influence on development, individual differences still seemed to be substantially influenced by genetic inheritance. The rank ordering of the children's IQ scores more closely resembled that of their biological mothers than that of their adoptive parents. The children whose biological mothers had the lowest IQ scores were likely to have lower IQ scores than the children whose biological mothers scored higher. Thus, although the absolute level of intellectual development was apparently boosted by the environmental influences provided by the adoptive parents, individual differences among the adopted children in intellectual performance—that is, their relative standings in this regard—appeared to stem more from their biological inheritance than from the increased intellectual stimulation provided in their adoptive homes.

Another qualification we must place on these research findings is that because the researchers studied primarily children adopted into middle-class families, they may have limited the expression of environmental influences. Among children adopted into families from a wider range of socioeconomic backgrounds, environment probably makes a greater contribution to individual differences in intellectual performance. For example, studies have shown that adopted children in economically disadvantaged homes have lower IQ scores and are more likely to drop out of school than those placed with more well-to-do families (Capron & Duyme, 1989; Duyme, 1988).

Thus, although twin studies and adoptive studies agree in showing that genetic factors make an important contribution to individual differences in IQ, environmental factors can also be important contributors to these differences, especially when there are wide disparities in the contexts in which individuals live. As you will see in Chapter 10, very poor or stressful environments can dramatically lower IQ scores, and cognitively stimulating environments or intervention programs can raise them.

TEMPERAMENT AND PERSONALITY   Even in infants' earliest days of life, we can see marked differences in what we call **temperament**, or the individual's typical mode of response to the environment, including such things as activity level, adaptability to new situations, and intensity of emotional expression. We use the term temperament to describe these kinds of individual differences in infants and children. In adolescence and adulthood, these styles of responses to the world are often discussed as different aspects of personality, such as emotionality, activity, and sociability. (We revisit these issues in Chapter 6.)

Thomas and Chess (1986) have proposed a typology of temperament that has been widely accepted. This framework classifies infants as *difficult*, *easy*, or *slow-to-warm-up*, and each of these types is associated with a distinctive pattern of behavioral responses (Rothbart & Bates, 2006; Thomas & Chess, 1986). Difficult infants (about 10% of all babies) sleep and eat irregularly, become easily upset by new situations, and experience extremes of fussiness and crying. In contrast, easy babies (about 40%) are friendly, happy, and adaptable. Even in the same family, babies may exhibit both of these dramatically different temperaments.

temperament The individual's typical mode of response to the environment, including such things as activity level, emotional intensity, and attention span; used particularly to describe infants' and children's behavior.

Nothing was easy with Chris . . . It would take me an hour and a half to get part of a bottle into him and he'd be hungry two hours later. I can't remember once in the first two years when he didn't go to bed crying. I'd try to rock him to sleep but as soon as I'd tiptoe over to put him in his crib his head would lurch up and he'd start bellowing again. He didn't like any kind of changes in his routine. New people and places upset him so it was hard to take him anywhere.

John was my touchy feely baby. From the first day in the hospital he cuddled and seemed so contented to be held I could hardly bear to put him down. He didn't cry unless something was wrong—he was wet, or hungry, or tired. We took him everywhere because he seemed to enjoy new things. You could always sit him in a corner and he'd entertain himself. Sometimes I'd forget he was there until he'd start laughing or prattling. (Thomas & Chess, 1986, pp. 19–20)

The slow-to-warm-up child is low in activity level and tends to respond negatively to new stimuli at first but to adapt slowly to new objects or novel experiences after repeated contact with them. Essentially, these children fall somewhere between difficult and easy children; on first exposure to something strange, they may look like difficult children, but they gradually show quiet interest, much like an easy child.

Rothbart and her colleagues (Putnam et al., 2002; Rothbart, 1981) have developed a measure of temperament known as the Infant Behavior Questionnaire. Compared with Thomas and Chess's more global types, this newer approach describes more discrete aspects of temperament that can be more precisely measured. The six scales of this instrument are (a) positive affect, (b) irritable distress, (c) fearful distress, (d) activity level, (e) attention span/persistence, and (f) rhythmicity (Table 2-6). They have also developed a similar temperament measure for toddlers, young children, early adolescents, and adults (Goldsmith et al., 2001; Putnam et al., 2002). Temperament, of course, is expressed in different ways as the individual grows older. For example, in infancy, we may identify persistence by the length of time a baby looks at an object, whereas in childhood, we may measure this component by the length of time a child continues to work on a puzzle or problem.

Researchers have also compiled evidence for differences in newborn temperament among children of different ethnicities and races. For instance, Chinese American babies, in contrast to European American and Irish infants, have been described as generally calmer, easier to console, more able to quiet themselves after crying, and faster to adapt to external stimulation or changes (Freedman, 1974; Kagan, 1994). Similarly, Lewis et al. (1993) reported that Japanese infants between the ages of 2 and 6 months were less reactive than European American infants during well-baby examinations and that they were less likely to display intense distress at being inoculated.

Table 2-6

Components of infant temperament

Source: Rothbart & Bates, 2006.

Component	Description
Positive affect	Measured by a child's smiling, laughter, cooperativeness, and manageability
Irritable distress	Indexed by a child's irritability, fussiness, anger, frustration, and distress at limitations on her behavior
Fearful distress	Assessed by the length of time a child requires to adjust to a new situation, or his adaptability, and by the child's tendency to withdraw and show distress in new situations
Activity level	Indexed by the child's tendency to be more or less active
Attention span/persistence	Measured by a child's ability to concentrate, focus on a task, and continue to work at a problem
Rhythmicity	Assessed by the predictability or regularity of a child's behavior patterns

A variety of cultural differences in the perception of infant temperament have been found for different East African societies. The Digo, for example, view the infant as active and able to learn within a few months after birth, whereas the Kikuyu view their infants as passive, keep them swaddled for the first year, and believe that real learning is not possible until the second year (DeVries & Sameroff, 1984). Parents provide different opportunities for learning depending on their assumptions about their infant's temperament. These findings underscore the ways in which cultural beliefs about the nature of infant temperament may, in part, shape the nature of the infant's early capacities. Even within cultures, temperamental differences may contribute to the type of caregiving that infants receive. Among the Masai of Kenya, under famine conditions, fussy, irritable infants are more likely to secure a greater share of available food than are calm, placid infants (DeVries, 1984). Cultural beliefs shape temperament, just as temperament shapes the ways caregivers behave (Kerr, 2001; Rothbart & Bates, 2006; Sameroff, 1994).

A higher rate of developmental problems appears in later life among children described by their mothers as difficult babies (Goldsmith et al., 2001; Halverson & Deal, 2001; Rothbart & Bates, 2006). Two factors may contribute to this relationship. First, a less malleable child is likely to find it harder to adapt to environmental demands and so is more prone to stress and the toll it takes on emotional well-being. A second factor, which has been demonstrated in research studies, is that a child with a difficult temperament is more apt to elicit adverse reactions from other people and thus to suffer the psychological damage caused by social rejection. Children with difficult temperaments have been found to serve as targets for parental irritability, especially when the parents are under stress. Stressed mothers are especially likely to withdraw affection from temperamentally difficult boys and to show irritation with them (Rothbart & Bates, 2006). If a mother is under multiple stresses and lacks a supportive family or friendship network, dealing with a difficult baby may disrupt the development of a harmonious mother-infant relationship and increase the likelihood that the child will exhibit developmental problems later (Crockenberg, 1981).

On the other hand, the finding that a difficult baby is not likely to suffer any long-term negative effects if its parents are calm and supportive (Rothbart & Bates, 2006) suggests that the match between the child's temperament and the environment is important. Thomas and Chess (1986) have termed this match between the child's temperament and the child-rearing environment **goodness of fit**. This model reminds us that the effects of temperamental predispositions will depend on how well parents and other agents of socialization are able to accept and adapt to each child's particular temperament. As we will see in our later discussion of moral development, fearful children have been found to develop greater self-control, or conscience, when their parents use gentle discipline; in contrast, however, parental strategies that focused on positive motivation were seen to promote more self-control in fearless children (Kagan & Snidman, 2004; Kochanska, 1997). As the goodness of fit model suggests, development progresses more smoothly when parents adjust their approach to suit the child's unique temperament.

How do heredity and environment affect temperament and personality? Scientists assumed for some time that both are at least in part genetically determined, although arguments have been made on both sides of the issue. Some studies have suggested that prenatal environment and environmental factors at birth may make larger contributions than heredity to infant temperament (Riese, 1990). At the same time, genetic influences on temperament seem to become increasingly prominent throughout early childhood (Dunn & Plomin, 1991; Wachs & Kohnstamm, 2001). It may be that although some individual differences are partly genetic in origin, they are nevertheless susceptible to environmental influences, particularly interactions among family members (Grigorenko, 2002; Rutter, 2006). Personality traits show some stability over time, which might suggest a genetic influence, but most psychologists today consider that both heredity and environmental factors contribute to personality in the same way that they do—as we've already noted—to other human characteristics.

goodness of fit A measure of the degree to which a child's temperament is matched by her environment; the more effectively parents and other agents of socialization accept and adapt to the child's unique temperament, the better this "fit."

Making the Connections 2

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 2 and discussions in other chapters of this book.

Chapter 2
Heredity and the Environment

→ **Genetics play a role in obesity.**
In Chapter 5, "The Child's Growth: Brain, Body, Motor Skills, and Sexual Maturation," p. 164

→ **Identical twins show greater agreement in level of fearfulness than do fraternal twins.**
In Chapter 6, "Emotional Development and Attachment," p. 181

→ **Nativist theorists argue for the genetic basis of language.**
In Chapter 7, "Language and Communication," pp. 235–238

Studies have shown that heredity contributes to individual differences in a number of temperament characteristics and personality traits: emotionality, fears and anxieties, activity level, attention span and persistence, and the tendencies to maintain high moral standards and to obey authority (Kagan & Fox, 2006; Kochanska, 1995). According to Plomin (1995), inheritance apparently contributes most to emotionality, activity level, and sociability. But even in such cases, the environment plays a moderating role in how these genetic influences are expressed (see also Box 2-3). Temperament and personality show a declining link with genetic factors as people age, however, and differing life experiences seem more significant among older people (Plomin et al., 1988).

SUMMARY

- During the course of development, the **genotype** interacts with the environment in complex ways to produce the **phenotype**. Scientists study the phenotypic expression of individual physical and behavioral characteristics in an effort to understand how genes and the environment interact to produce each unique human being.

The Process of Genetic Transmission

- Within each cell nucleus are threadlike structures called **chromosomes**, on which **genes** containing the genetic code are located. Genetic variability is the result of (a) the huge number of chromosome combinations that are possible during the formation of sperm and egg cells and (b) **crossing over**, which occurs during the kind of cell division called **meiosis** and involves the exchange of genes on homologous chromosomes. Sexual reproduction, or the union of **ovum** with **sperm**, also contributes to genetic variability, as 23 chromosomes from a woman unite with 23 chromosomes from a man

to form the zygote. Through the process of **mitosis**, this new **autosome** divides and continues to divide, eventually producing a new, multicellular organism.

- Chromosomes are bound by molecules of **deoxyribonucleic acid (DNA)**, which are made up of **nucleotides**. Genes, portions of the DNA molecule, are located at particular sites on the chromosome where they code for the production of certain kinds of protein. When a gene is activated, a copy of it travels from the cell nucleus to the body of the cell, where it serves as a template for building a protein molecule. Each of the many different kinds of proteins in the human body serves a different function. All of them, working together, are what make a living organism.

Genetic Influences on Development

- At any given gene's position on two homologous chromosomes, there can be more than one form, or **allele**, of that gene. If the two alleles are the same,

the person is **homozygous** for that particular characteristic; if the alleles are different, the person is **heterozygous**. Heterozygous combinations may be expressed in three ways: (a) the person may have a trait intermediate between the traits that each of the two alleles codes for; (b) both alleles may express their traits simultaneously in an outcome called **codominance**; or (c) a **dominant** allele may overcome the other, **recessive** allele, resulting in the expression of the dominant allele's trait.

- The 23rd pair of human chromosomes are the **sex chromosomes**, differing in males and females. Females have two large homologous sex chromosomes, forming an XX pattern; males have one X and a smaller Y chromosome, an XY pattern. Because an X chromosome is about five times longer than a Y chromosome, it carries more genes. This means that, in males, some genes on the X chromosome have no equivalent genes on the Y chromosome; the person inherits only one each of these **X-linked genes**. If the inherited gene happens to be a harmful recessive allele, the associated genetic disorder will automatically be expressed. **Hemophilia**, a disease in which the blood fails to clot, is an example of an X-linked recessive trait.

- Many human characteristics are influenced by complex interactions among multiple genes acting together. This interaction of multiple genes may help explain why some traits influenced by genes do not tend to run in families. Their development depends on a configuration of many genes, and that whole configuration is not likely to be passed on from parent to child. Further adding to the complexity of genetic influences on development, a single pair of alleles may influence more than one trait, and if they are **modifier genes**, they may do so not directly but indirectly through the effects they have on how other genes are expressed.

- Harmful alleles survive generally because, as in **phenylketonuria (PKU)**, they are not harmful in the heterozygous state. They may also survive, as they do in people who carry the allele for **sickle-cell anemia**, when they not only cause one disease but also protect people from another—in this case, from malaria.

- **Down syndrome** is one example of the many identifiable human chromosome disorders. It is caused by inheriting three 21st chromosomes instead of the normal two and is characterized by both physical and mental retardation and a distinctive physical appearance. Abnormalities can also arise in the sex chromosomes. Examples are **Turner syndrome** (an XO pattern), the triple-X syndrome, **Klinefelter's syndrome** (an XXY pattern), the double-Y syndrome (an XYY pattern), and **fragile X syndrome**. The physical, psychological, and emotional characteristics of people with these chromosome aberrations vary widely depending on the specific chromosome pattern and environmental factors involved.

Genetic Counseling and Genetic Engineering

- Advances in biology and genetics have opened new opportunities for diagnosing genetic disorders before birth. The two methods most commonly used to collect samples of fetal cells for genetic analysis are **amniocentesis** and **chorionic villi sampling**. Other diagnostic methods include the **alphafeto-protein (AFP) assay** and **ultrasound**.

- Scientists hope eventually to locate the genes responsible for all inherited disorders. A breakthrough occurred when researchers identified the genetic marker for **Huntington disease**, making it possible to develop a test for the Huntington gene. With the aim of treating or curing genetic disorders, scientists are exploring gene therapy, which involves inserting normal alleles into a patient's cells to compensate for defective alleles. Theoretically, normal genes could even replace defective ones in sperm or egg cells, or they could be inserted into a newly created zygote.

Heredity-Environment Interactions

- The concept of the **range of reaction** helps shed light on how environments influence genes. According to this concept, heredity does not rigidly fix behavior but instead establishes a range of possible developmental outcomes that may occur in response to different environments. When a reaction range is extremely narrow, it is said to exhibit **canalization**. With a highly canalized trait, there are few pathways that development can take, and intense or more specific environmental pushes are required to deflect the course of development.

- Not only does environment influence genes, but genes also influence the environments to which people are exposed. In one way, called the **passive genetic-environmental interaction**, parents with certain genetic predispositions create a home environment that suits those predispositions and that may also suit and encourage the inherited predispositions of their children. In another way, known as **evocative genetic-environmental interaction**, people's inherited tendencies may evoke certain responses from others, as when a baby's inborn tendency to smile elicits positive stimulation from others. In a third way, called **active**

genetic-environmental interaction, each person's genetic makeup may encourage him to seek out experiences compatible with his inherited tendencies. Also known as **niche picking**, in this form of interaction, people who are, for example, naturally gregarious will look for opportunities to interact with other people in social activities.

Heredity, Environment, and Individual Differences

- An important question that researchers ask is why significant differences exist in individual development. **Human behavior genetics** seeks to answer this question by calculating **heritability factors**—percentage estimates of the contribution that genes make to some observed individual difference. Commonly, researchers study family members with known degrees of biological relatedness, such as **monozygotic** and **dizygotic** twins and adopted children, as well as the degree to which they inhabit **shared** or **nonshared environments**.

- Family resemblance studies consistently show that individual differences in IQ scores are substantially influenced by genetic factors. In addition, individual differences in certain more specific cognitive abilities, including spatial skills and verbal proficiency, are also influenced by genes, as are differences in the timing and rate of mental development. Nevertheless, an enriched environment can boost a child's level of intellectual development considerably.

- Heredity contributes to many individual differences in **temperament** and personality, especially differences in emotionality, activity level, and sociability. However, the contribution of heredity to differences in these traits appears to decline with age, as people's personalities become increasingly influenced by their life experiences.

- Whether early judgment of an infant as *difficult, easy*, or *slow-to-warm-up* has implications for a child's personality in later life may depend to a considerable degree on the **goodness of fit** between the child's temperament and the child-rearing environment. A child's development can progress more smoothly and successfully when parents adjust their approach to suit their child's unique temperament.

EXPLORE AND DISCUSS

1. There is an ongoing debate about whether young people should be told if they are carriers of defective genes that may in the future lead them to have children with genetically caused disorders. Do you think children or even young adults should be given this information or not? Explain your position.

2. Two friends ask you about the heredity versus environment debate: One is a strong believer in the influence of the environment, and the other is committed to a belief in the importance of heredity. In light of our discussions in this chapter, what would you tell your friends to convince them that there are problems with both of these positions?

3. Many human characteristics have a genetic basis, and some of these characteristics can be modified by intervention. But should we modify a human characteristic just because we have the ability to do so? Do you think such interventions might lead to a societal view that some characteristics are more acceptable than others? Explain your answer.

House door panel with an X-ray drawing of a pregnant woman. Collected in 1887 at Sieby Village, Geelvink Bay, Irian Jaya.

3.

Prenatal Development and Birth

Waiting for the birth of a child can be one of the most joyous times in people's lives. Couples look forward to becoming parents and enjoy preparing for their baby's arrival. They may even try to influence the new family member by playing favorite music or reading to their unborn child!

Whether it's possible to influence a baby in such positive ways during pregnancy is not entirely certain, although as we will see, there is some evidence that babies learn in utero. Unfortunately, however, clear evidence indicates that the developing organism is vulnerable to a variety of negative influences. Some of these influences are genetic, as we saw in Chapter 2, and others result from variations in the prenatal environment caused by factors and events that affect the mother during her pregnancy. A large number of negative influences—including medications and diagnostic procedures; prescription, nonprescription, and other legal and illegal drugs; maternal age and *parity* (whether a woman has had a child before); illness, dietary deficiencies, and emotional distress; and environmental toxins—can affect the normal development of a child from its first weeks of gestation. In addition, events occurring during childbirth may threaten the health of a newborn.

We begin this chapter by exploring the normal development of the human being from conception to delivery and then discuss the many factors that can threaten normal development throughout pregnancy. We look at normal childbirth and at some of the complications of labor and delivery, including the problems of prematurity and low birthweight. We conclude the chapter with a review of the research that has explored the long-term effects of pregnancy and birth complications as well as the resilience some children show in the face of such difficulties. Throughout these discussions, we will ask several questions: What are the most significant of these negative influences? How does the timing of their appearance in the prenatal environment affect their impact on the developing infant? Perhaps most important, how do perinatal factors (those occurring shortly before or after birth) affect the child's later development, and can any postnatal experiences alter the effects of these early negative influences?

STAGES OF PRENATAL DEVELOPMENT

Conception usually takes place during a woman's ovulation or within a few days of it; the ovum, or egg, once released from the mother's ovaries, lives only about 3 to 5 days. Prenatal development, then, encompasses the 38 weeks, or approximately 9 months, between conception and birth. Over these months, the new organism changes in many ways. The kinds, numbers, positions, sizes, and shapes of cells, tissues, and bodily systems change, and these systems usually increase in size and complexity.

The 9 months of prenatal development are characterized in two ways. Traditionally, pregnancy has been described as occurring in three trimesters, or three periods of 3 months each, and we often speak of a particular event as occurring in one or another trimester. Increasingly, however, we talk about the three periods of (a) the zygote, (b) the embryo, and (c) the fetus. Although they are distinct in many ways, these periods comprise continuous phases of development during which the organism becomes increasingly complex and differentiated. Figure 3-1 illustrates these changes, from ovulation, when the ovum embarks on its journey to the uterus, to the end of the second trimester, when the fetus appears fully human.

The Zygote

zygote The developing organism from the time sperm and egg unite to about the second week of gestation; the period of the zygote comprises the implantation of the fertilized egg in the wall of the uterus.

The period of the zygote is approximately the first 2 weeks of life. During this time, a sperm fertilizes the ovum, now referred to as a **zygote**, or fertilized egg, which then proceeds down the mother's fallopian tube and implants in the wall of the uterus. When the zygote implants in the uterine wall, about 7 days after conception, it is very small: 100 to 200 zygotes placed side by side would measure only an inch, and some 5 million would weigh only an ounce. Gradually, tendrils or stems from the zygote penetrate the blood vessels in the wall of the uterus. At this point, the zygote begins a physiologically dependence with the mother that will continue throughout the course of prenatal development.

The Embryo

embryo The developing organism between the second and eighth week of gestation; the embryonic period comprises the differentiation of the major physiological structures and systems.

gestation The carrying of an embryo or fetus during pregnancy, usually for 9 months in humans.

amniotic sac A membrane that contains the developing organism and the amniotic fluid around it; sac and fluid protect the organism from physical shocks and temperature changes.

Once the zygote is firmly implanted in the mother's uterus, the second prenatal period, the period of the **embryo**, begins. This is a period of rapid growth that lasts from the beginning of the third week of **gestation**, the term for the entire period of development in the uterus, until the end of the eighth week. During the embryonic period, the organism's most important physiological structures and systems become distinct or differentiated, and the embryo becomes recognizable as a tiny human being. Development during the first 8 weeks of gestation is rapid: From the time of fertilization until the end of the embryonic period, the infant increases 2 million percent in size!

During this period, three crucial structures develop to protect and support the growing life within the mother's uterus: the amniotic sac, the placenta, and the umbilical cord. The **amniotic sac** is a thin membrane around the developing organism that contains the *amniotic fluid*, a watery liquid in which the developing embryo floats and which serves as a protective buffer against physical shocks and temperature changes. The tendrils that attach the embryo to the uterine wall increase in size and complexity to form a fleshy disklike structure called the **placenta**. The embryo is joined to the placenta at the abdomen by the **umbilical cord**, a tube that contains the vessels that carry blood back and forth between the infant and placenta. (The umbilical cord attains a final length slightly greater than that of the growing organism, permitting the organism considerable mobility within the uterine environment.) Because semipermeable membranes within the placenta separate the bloodstreams of mother and child, some substances pass from mother to infant. The placenta and umbilical cord transmit

oxygen and nutrients to the infant and remove carbon dioxide and waste products from it, but they do not permit the direct exchange of blood. Unfortunately, certain potentially destructive substances, such as drugs, hormones, viruses, and antibodies from the mother, can also pass through the placenta to the embryo.

During the embryonic period, the inner mass of the developing organism differentiates into three layers: the ectoderm, the mesoderm, and the endoderm. From the *ectoderm*, the hair, nails, parts of the teeth, the outer layer of the skin and skin glands, and the sensory cells and nervous system develop. The *mesoderm* forms into the muscles, skeleton, circulatory and excretory systems, and inner skin layer. From the *endoderm* come the gastrointestinal tract, trachea, bronchi, Eustachian tubes, glands, and vital organs such as the lungs, pancreas, and liver. The especially rapid development and differentiation that occur at this time make the embryo particularly susceptible to environmental assault. As a result, it is the period when most gross congenital anomalies occur. For example, about the fourth or fifth week of gestation, the *neural folds* (formations that evolve into the central nervous system) begin to close. If something occurs to prevent the neural folds from closing completely, the child will have *spina bifida*, a disorder in which the spinal cord and the membranes that protect it may protrude from the spinal column. Also at about the fourth week, the organism's head begins to take shape, followed by the eyes, nose, and mouth. The blood vessel that will become the heart begins to pulsate. By the fifth week, buds that will form arms and legs begin to appear.

Prenatal development is guided by two principles: cephalocaudal and proximal-distal. **Cephalocaudal** (the term *cephalocaudal* derives from the Latin words for "head" and "tail") means that development proceeds from the head downward to the trunk and legs. **Proximal-distal** (again, from Latin words for "toward the center" and "away from the center") means that growth occurs first in central areas, such as internal organs, and then in more distant areas, such as arms and legs. (We return to these principles when we discuss postnatal physical growth in Chapter 5.)

By the end of the embryonic period, the growing organism's face and features are detailed, and fingers, toes, and external genitalia are present. Even at 6 weeks, the embryo is recognizable as a human being, although a rather strangely proportioned one; the head is almost as large as the rest of the body.

Most **miscarriages**, or spontaneous abortions, occur during this period; for one reason or another, the embryo becomes detached from the wall of the uterus and is expelled through the vaginal canal. The rate of miscarriage has been estimated as high as one in four pregnancies, but many miscarriages are not detected because they occur in the first few weeks of pregnancy. This high rate of natural abortion may be advantageous to the species, for the great majority of embryos aborted in this manner have gross chromosomal and genetic disorders.

The Fetus

During the third and final period of prenatal development, the **fetus**—the term for the developing organism from the beginning of the third month of gestation to delivery—experiences rapid development of muscles and the central nervous system. At the end of the third month, the fetus has all its body parts, including external genital organs. By the end of the fourth month, mothers usually report that they feel the fetus move. At around 5 months, reflexes such as sucking, swallowing, and hiccuping usually appear. After the fifth month, the fetus develops nails and sweat glands, a coarser, more adult-like skin, and soft hair, called **lanugo**, which covers the body. Most fetuses shed this hair in utero, but some continue to shed it after birth. By 6 months, the eyes can open and close. If an infant is born prematurely at 6 months, the regulatory processes and nervous and respiratory systems are usually not mature enough for survival without intensive intervention. At this time, the fetus cannot produce and maintain an adequate amount of *surfactant*, a liquid that allows the lungs to transmit oxygen from the air to

placenta A fleshy, disklike structure formed by cells from the lining of the uterus and from the *zygote* that, together with the *umbilical cord*, serves to protect and sustain the life of the growing organism.

umbilical cord A tube that contains blood vessels connecting the growing organism and its mother by way of the *placenta*; it carries oxygen and nutrients to the growing infant and removes carbon dioxide and waste products.

cephalocaudal The pattern of human physical growth in which development begins in the area of the brain and proceeds downward to the trunk and legs.

proximal-distal The pattern of human physical growth wherein development starts in central areas, such as the internal organs, and proceeds to more distant areas, such as arms and legs.

miscarriage The natural or spontaneous end of a pregnancy before the infant is capable of survival outside the womb and generally defined in humans as prior to 20 weeks gestation.

fetus The developing organism from the third month of gestation through delivery; during the fetal period, bodily structures and systems develop to completion.

lanugo A fine, soft hair that covers the fetus's body from about the fifth month of gestation on; may be shed before birth or after.

4. By **day 4,** the egg becomes a *morula,* a solid ball of cells.
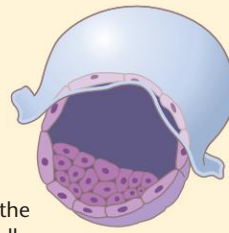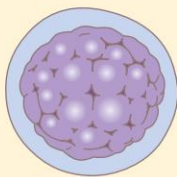
5. On **day 5,** the *blastocyst,* a hollow ball of cells, hatches from the coat that surrounded the egg.

3. During **day 1,** the egg divides into two cells.
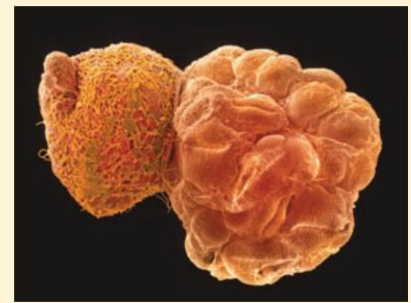
Blastocyst embryo seen through an electron microscope
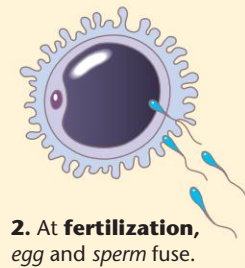
2. At **fertilization,** *egg* and *sperm* fuse.

6. By **day 7,** implantation is under way.

1. In **ovulation,** the *ovary* releases an egg cell into the *fallopian tube.*
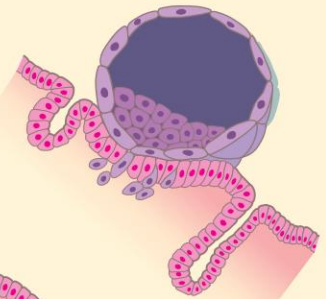
7. On **day 9,** the *zygote* consists of *two cell layers,* and the *chorion* has begun to form.
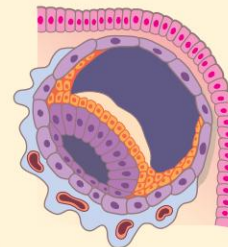
8. On **day 16,** gastrulation is occurring, producing 3 cell layers: *ectoderm,* which forms skin and nervous system; *mesoderm,* which becomes muscle, blood, and bone; and *endoderm,* which forms the lungs and digestive tract.
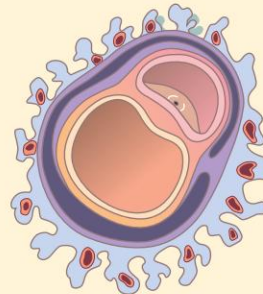
10. Day 25. The *yolk sac* will become incorporated into the *umbilical cord.*
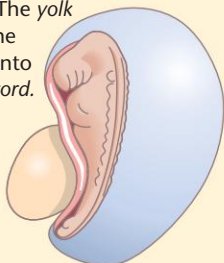
9. On **day 21,** the *neural tube* is forming.
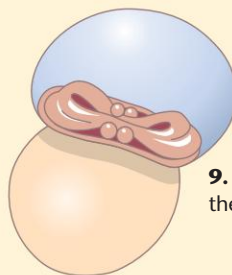
The first 6 weeks are crucial for development of the central nervous system.
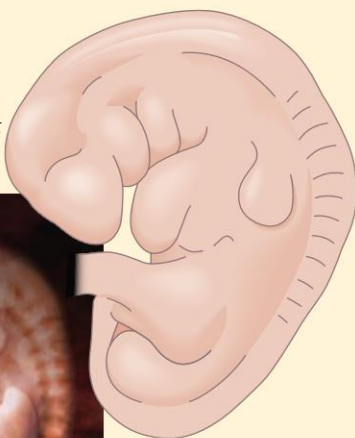
11. On **day 36,** the *embryo* is vaguely fish-like, with *eyes, gill-like arches,* a large *heart,* paddle-shaped *limbs,* and a *tail.*

12. By **day 48,** *fingers* start to form.

13. By **day 52,** almost two months, the embryo begins to look like a person.

Figure 3-1

The marvel of human development
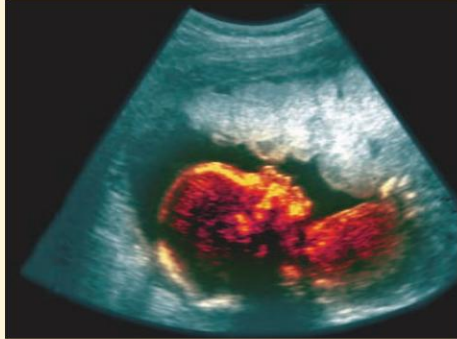
Ultrasound of a 5 month old fetus

15. 6 months (actual size).

14. The *fetus* at **4 months** (actual size).

At six months, the unborn child is covered with a fine, downy hair called lanugo. Its tender skin is protected by a waxy substance called vernix.

the blood. Without surfactant, infants are often unable to breathe adequately, and they may develop **respiratory distress syndrome**, a condition of the newborn marked by labored breathing and a bluish discoloration of the skin or mucous membranes. This syndrome, which is often heralded by such symptoms as flaring nostrils and a gruntlike sound on expiration, can result in death.

The age of 22 to 26 weeks, sometimes referred to as the **age of viability**, is an important point in fetal development. By this time, the fetus's physical systems are sufficiently advanced that the child, if born prematurely, has a reasonable probability of surviving. With the exceptional resources available in modern intensive-care nurseries, infants as immature as 22 weeks can sometimes live. Notice in this chapter's Turning Points chart (pp. 80–81), however, that many systems are still developing; the respiratory system in particular continues to evolve into the ninth month of gestation. Thus, babies born before 28 weeks can have many difficulties, especially if they encounter other adverse environmental conditions (Moore & Persaud, 1998).

RISKS IN THE PRENATAL ENVIRONMENT

During the course of prenatal development, many external agents may cause developmental deviations in the fetus. These agents are called **teratogens**, a term that derives from the Greek word *teras*, meaning "monster" or "marvel." Teratogens encompass a wide variety of agents, including prescription and nonprescription medications and drugs taken by the mother and environmental toxins, such as pollution. Although teratogens are environmental factors, other factors like the mother's age, her diet, and her emotional state affect the response of mother and child to any given teratogen. In this section, we consider the prenatal hazards in the environment, along with the risks these pose to the developing child.

In considering the effects of teratogens on prenatal development, we discuss the physical defects or mental impairments that may occur. We also discuss how these factors change the life experiences of the child. How is the emotional bond between parent and child affected by the infant's longer stay in the hospital? Is the parent more anxious or more protective? Or does the parent reject the child? Experiential factors such as these may ultimately be the most important in sustaining or minimizing the long-term effects of early difficulties.

Teratogens exert their effects on prenatal development in specific ways (Briggs et al., 2005; Friedman & Polifka, 1996; Moore & Persaud, 1998).

1. *A teratogen exerts its effects largely during critical periods of development.* As Figure 3-2 shows, the organism is most vulnerable to teratogens during the embryonic stage. However, each organ system has a different critical period. For example, the most vulnerable period for the heart is between 20 and 40 days after conception.

2. *Each teratogen has specific effects.* Different teratogens influence different developmental processes. For example, *rubella*, or German measles, in the mother affects mainly the fetus's heart, eyes, and brain. The drug thalidomide causes malformations of the limbs.

3. *Maternal or fetal genotypes may counteract a teratogen's effects.* Maternal and fetal genotypes affect the developing infant's response to teratogenic agents and play a role in determining whether the infant displays abnormalities. For example, not all pregnant women who have German measles have defective infants; infants who develop defects do so because of their own or their mother's genetic vulnerability to that teratogen.

4. *The effects of one teratogen may intensify the effects of another.* The mother's physiological status, nutrition, and hormonal balance modify the impact of a teratogen. For example, nutritional deficiencies, which interfere with healthy

Weeks of gestation, from conception to full term
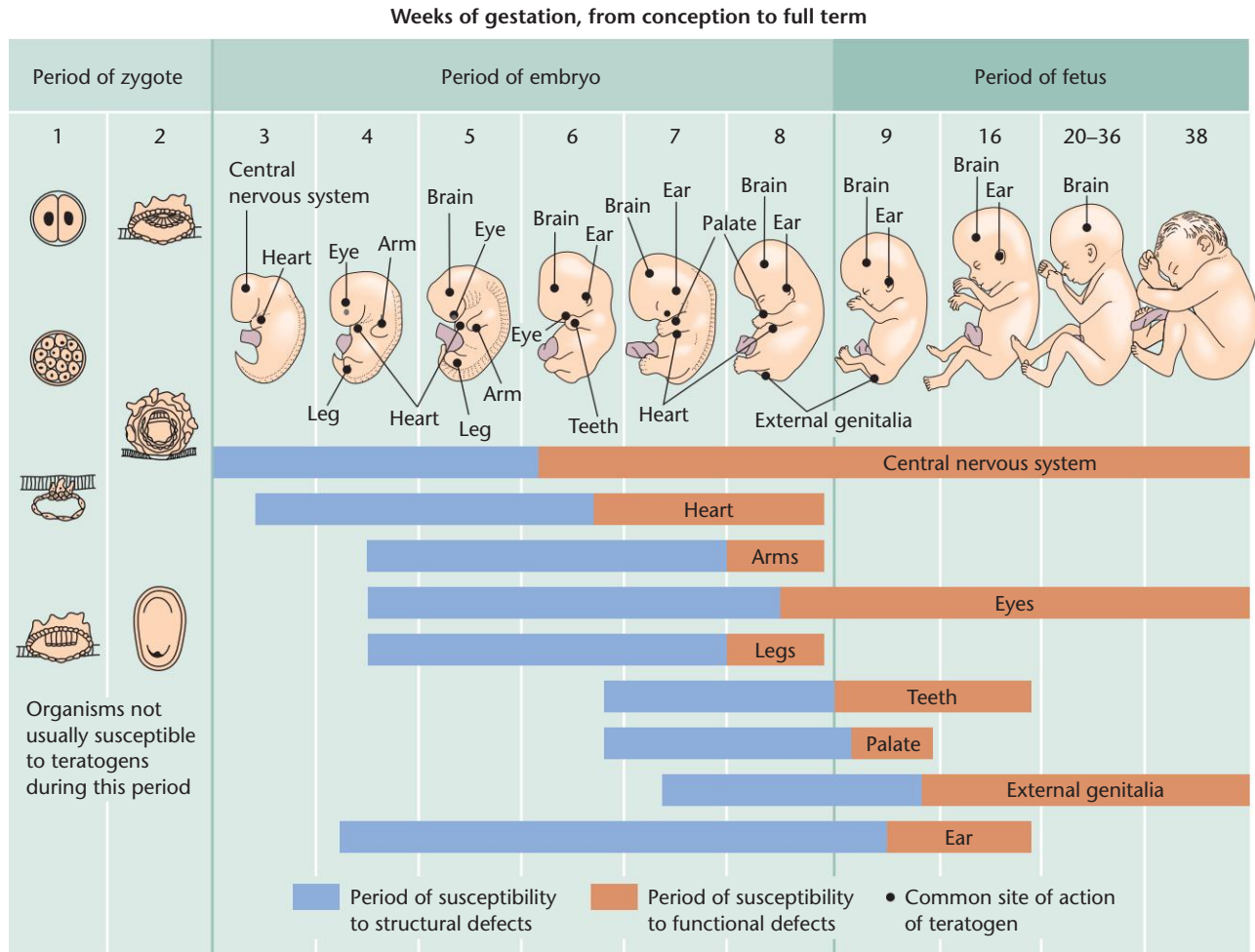
Figure 3-2   The child's prenatal susceptibility to teratogenic agents

Sensitivity of the growing embryo to teratogens is greatest in the first 4 to 8 weeks of gestation, peaking about the fifth week. Normally, the zygote is not susceptible to specific teratogens, but if it does succumb to a teratogenic agent, its tiny mass is usually so defenseless that it dies. The defects that occur early in development, when critical organs are being formed, are generally structural; teratogenic agents that affect the fetus in later weeks are more likely to stunt growth or cause functional problems.

Source: Adapted from Moore, 1989.

prenatal development, also intensify the adverse effects of drugs that the mother has ingested.

5. *Different teratogens may produce the same defect.* For example, deafness may result if the mother contracts rubella or if she ingests a drug such as quinine or streptomycin.

6. *The longer a fetus is exposed to a teratogen and the greater the intensity of the teratogen, the more likely it is that the fetus will be harmed.* This is the *dose-response* principle at work: In general, the higher the dose, the more severe the damage to the developing fetus.

Environmental Dangers

We know that illegal drugs, such as heroin, and other drugs in common use, such as alcohol and nicotine, are often harmful to human beings. Thus, it should come as no surprise that these substances can be extremely harmful—even life-threatening—to the prenatal infant.

Turning Points

AN OVERVIEW OF PRENATAL DEVELOPMENT

Month	Size & Weight	Nervous & Sensory Systems	Cardiovascular & Respiratory Systems	Musculoskeletal & Dermal Systems	Digestive & Urinary Systems	Endocrine & Reproductive Systems	Other Events
1 (Zygote → Embryo)	0.2 in. .007 oz	Neural tube (B) Eyes, ears (B)	Heartbeat (B) Trachea & lungs (B)		Intestinal tract, liver, pancreas (B)		
2 (Embryo)	1.1 in. .09 oz	Nervous system organization, growth of cerebrum (B) Taste buds, olfactory system (B)	Heart structure, major blood vessels, lymph nodes (B) Blood formation in liver (B) Bronchial branching (B) Diaphragm (C)	Cartilage formation (B) Muscles that support central portion of body formed (C)	Intestinal subdivisions including salivary glands (B) Kidney formation (B)	Thyroid, pituitary, adrenal glands (B) Mammary glands (B)	
3	3.2 in. 1.6 oz	Basic spinal cord & brain structure (C)	Tonsils; blood formation in bone marrow (B)	Cartilage replaced with bone (B) Muscles that support appendages (e.g., legs, arms) formed (C) Skeleton visible in X-rays by 14 weeks	Gallbladder, pancreas (C)	Genitalia (B) Differentiation of gonads into ovaries & testes	Fetus responds to stimulation Form is recognizably human Mother's abdomen visibly distended Mother can feel baby's movements
4	5.3 in. 5 oz	Rapid expansion of cerebrum (B) Eye & ear structure complete (C)	Blood formation in spleen (B) Lymphocytes migrate to lymphatic organs (B)	Lanugo & head hair form (B) Skin thin, wrinkled, translucent Sweat glands (C)		Genitalia distinct by 16 weeks	
5	8 in. 17 oz	Myelination of spinal cord (B)	Nostrils open (C)	Adultlike skin Eyelashes & eyebrows Nail production (B)	Intestinal subdivisions (C)		Fetus sucks, swallows, & hiccoughs Evidence of Babinski & grasping reflexes

First trimester

Second trimester

6 (Fetus)	11.2 in. 1 lb, 10 oz	CNS tract formation; layering of cerebral cortex (B)	Spleen, liver, & bone marrow (C) Formation of lung alveoli (B)	Perineal (sphincter) muscles (C)	Adrenal glands (C)	Survival outside womb relatively rare
7	14–15 in. 2 lb, 11 oz	Eyelids open; retina sensitive to light	Nails & hair formation (B)		Pituitary gland (C) Descent of testes into scrotum (B)	Survival outside womb not uncommon Rapid weight gain begins Sensitivity to sounds
8	15–17 in. 4 lb, 6 oz	Taste receptors become functional	Pulmonary branching & alveolar formation (C)	Kidney structure (C)		
9	19–21 in. 6 lb, 10 oz to 7 lb, 10 oz	CNS tract formation continues	Immune system becomes operative	Hair changes in consistency & distribution Skeletal growth continues Muscle mass & control increase	Descent of testes complete at or near time of delivery	Normal birth

Third trimester

Key: B = Begins to form   C = Completes formation
Sources: Based on Fischer & Lazarson, 1984; Martini, 1995; Moore & Persaud, 1998.

LEGAL AND ILLEGAL DRUGS   Although most physicians agree that pregnant women should not take too many drugs, nearly 90% of women take some sort of drug during pregnancy (Briggs et al., 2005; Cunningham et al., 1993). In many of these cases, women may not yet realize that they are pregnant. Even so, some over-the-counter (nonprescription) drugs, such as aspirin and diet pills, may have adverse effects on the fetus. For example, heavy use of aspirin has been associated with low birthweight, lower IQ, and poor motor control (Barr et al., 1990; Briggs et al., 2005). Too much caffeine, too, can adversely affect a developing fetus. Studies have found that women who drank three or more cups of coffee a day were at higher risk for miscarriage or for low-birthweight infants (Fernandes et al., 1998; Klebanoff et al., 1999).

Nicotine and Alcohol   The effects of nicotine and alcohol are particularly concerning. It has been estimated that over 80% of pregnant women in the United States drink alcohol and more than 30% smoke. Smoking and drinking are associated with disturbances in placental functioning and with changes in maternal physiology that lead to oxygen deprivation and thus to changes in the fetus's brain (Chomitz et al., 2000). The rate of spontaneous abortions, prematurity, and low-birthweight babies is also higher for mothers who smoke or drink than for those who do neither (Gilliland et al., 2001; Mills, 1999). Infants whose mothers use both tobacco and alcohol have more prenatal growth deficiencies than infants whose mothers use only one of these substances (Little, 1975). In addition, *sudden infant death syndrome (SIDS)*, in which infants under the age of 12 months stop breathing and die without apparent cause, is more common if mothers smoke, drink, or take narcotic drugs during pregnancy (Hunt, 2001). Moreover, smokers' babies are at greater risk for nicotine addiction in adolescence and adulthood (Law et al., 2003).

Even passive smoke—that is, smoke breathed in by nonsmokers—can contribute to low birthweight among the babies of mothers who don't smoke. One study found that if fathers smoked during pregnancy, their babies were 3 ounces (88 grams) lighter at birth than babies of nonsmoking fathers (Martinez et al., 1994). Other studies have shown that passive smoke can cause delays in intellectual and behavioral development (Friedman & Polifka, 1996) and that babies exposed in utero to passive smoke are at increased risk for a variety of illnesses such as pneumonia, bronchitis, laryngitis, and otitis media (middle ear infection) (Charlton, 1994).

As early as 1800, abnormalities in children of alcoholic mothers were reported in England. Concerns were expressed that the high consumption of gin, euphemistically known as "mother's ruin," was leading to increased rates of dwarfism in these women's offspring. Today, we know that **fetal alcohol syndrome** occurs in about 6% of infants of alcoholic mothers (Day & Richardson, 1994). Infants with this disorder have a high incidence of facial, heart, and limb defects; they are 20% shorter than the average child of their age and are often mentally retarded (Streissguth, 1997, 2007). The mental retardation may be related to the loss of oxygen in the fetal brain when the fetus's breathing ceases temporarily: It has been demonstrated that if in their last trimester women who are not heavy drinkers consume just 1 ounce of 80-proof vodka, the respiratory actions of their fetuses may stop for more than half an hour (Fox et al., 1978). Indeed, the fetal damage from alcohol appears to be greatest in the last trimester. If women can stop drinking during this period, their babies tend to be longer, weigh more, and have a larger head circumference than those of women who continue heavy drinking (Streissguth, 1997; 2007).

Children with fetal alcohol syndrome also exhibit a wide range of abnormal behaviors: They may be excessively irritable, distractible, and hyperactive and may engage in behaviors such as repeatedly banging their heads or rhythmically rocking their bodies. They may also be slow to show behaviors such as turning their heads or even sucking (Jacobson & Jacobson, 1996; Streissguth, 1997). Although the worst cases of fetal alcohol syndrome are seen in babies born to alcoholic mothers, even moderate drinking by a pregnant woman—say, a glass of beer or wine per day—can cause abnormal

fetal alcohol syndrome
A disorder exhibited by infants of alcoholic mothers and characterized by stunted growth, a number of physical and physiological abnormalities, and often, mental retardation.

behavior patterns in the baby (Abel, 1998; Willford et al., 2006). Furthermore, studies of older children indicate that many children whose mothers drink during pregnancy have problems paying attention, do more poorly in school, and get lower IQ test scores than other children (Burden et al., 2005; Connor et al., 2001; Streissguth, 1997) and in young adulthood (age 25) are at higher risk for alcohol problems and psychiatric disorders (Streissguth, 2007). Those who engage in bouts of heavy drinking are three times more likely to have a child with alcohol-related problems by age 21 (Baer et al., 2003). It is also important to note that the negative effects of alcohol on prenatal development may not be solely due to maternal drinking because men who drink heavily may sustain genetic damage that leads to birth defects in their offspring (Cicero, 1994).

Heroin, Cocaine, and Other Drugs The prenatal effects of drugs such as heroin, morphine, methamphetamine, cocaine, lysergic acid diethylamide (LSD), and marijuana are also of concern. Mothers who are addicted to heroin or morphine or who use cocaine have offspring who are also addicted or who sustain toxic effects from these drugs. Babies addicted to one of these drugs go through withdrawal symptoms: irritability, minimal ability to regulate their state of arousal, trembling, shrill crying, rapid respiration, and hyperactivity. Moreover, because these infants are often premature and of low birthweight, it is even more difficult for them to cope with the trauma of withdrawal (Lester et al., 2000; Messinger & Lester, 2006). In some cases, symptoms can be severe enough to result in an infant's death in the first few days of life (Lester et al., 2000). In general, the severity of the newborn's symptoms is related to the length, continuity, and intensity of the mother's addiction. If the mother stops taking drugs in the third trimester, the infant is less likely to be affected (Messinger & Lester, 2006).

At a time when an infant needs special attention and loving care, the behavior of infants exposed to these drugs may elicit the opposite kind of behavior from their drug-using parents. Although addicted babies' irritable behavior is likely to get the attention of a caregiver, these infants do not readily cuddle or cling. When their parents physically stimulate them or hold them to their shoulders, these infants do not act alert like normal babies. Clinging, acting alert, and maintaining eye contact are the main behaviors by which infants interact with their caregivers (Lester et al., 2000), and the lack of these behaviors in addicted newborns may disrupt parenting and have long-term adverse outcomes for parent-child relationships (Phillips et al., 1996). In fact, observations of interactions between mothers and addicted babies reveal their interactions tend to be out of synch with one another and negative (Tronick et al., 2005).

As many as 200,000 American babies born every year have mothers who used cocaine during pregnancy; in some inner-city areas, one in four births is to a cocaine-addicted mother (Chavkin, 1995). These babies also have physical defects, including bone, genital, urinary tract, kidney, eye, and heart deformities; brain hemorrhages; and neuron damage. Two common behavior patterns in the children of cocaine-addicted mothers are excitable, irritable behavior, high-pitched prolonged crying, and depressed, unresponsive behavior (Messinger & Lester, 2006). The first pattern is associated with direct toxic effects of cocaine on the neurological system; it is accompanied by irregular, accelerated heartbeat, elevated blood pressure, and constriction in the upper airways. The second pattern is likely an indirect result of cocaine use and is related to low birthweight and stunted growth. Some children show a combination of both patterns, appearing lethargic and sleeping a great deal but then waking up screaming and resisting efforts to soothe them. Recent research shows that long-term effects of maternal cocaine use on children's school performance depends on how supportive the child's environment turns out to be, and not all infants show detrimental effects on later academic achievement (Messinger & Lester, 2006).

ENVIRONMENTAL TOXINS Dangerous substances in the everyday environment are also harmful to children. These substances include radiation, lead, mercury, herbicides, pesticides, household cleaners, and even food additives and cosmetics.

Although there is still much to be learned about prenatal neurotoxicity, we have known for years that radiation can harm the developing fetus; it is for this reason that pregnant women are advised to avoid X-rays.

Lead is another well-documented toxin for pregnant women and developing fetuses. Women and babies may be exposed to lead by inadvertently inhaling automobile exhaust, drinking water contaminated by industrial waste, or living in an environment painted with lead-based paint. Exposure to lead during pregnancy has been associated with a variety of problems in newborns, including prematurity and low birthweight, brain damage, and physical defects, as well as with long-term problems in cognitive and intellectual functioning (Dietrich et al., 1993; Evans, 2004).

Another environmental hazard is polychlorinated biphenyls (PCBs), which were once used routinely in electrical transformers and capacitors. This use of these substances has been banned since the mid-1970s, when it was discovered that pregnant women who ate PCB-contaminated fish gave birth to infants with serious problems. These babies were smaller and weighed less, were less responsive, and were less neurologically advanced than infants not exposed to PCBs (Jacobson & Jacobson, 1996; Sagiv et al., 2007). Long-term effects of prenatal exposure to PCBs include lower IQ, poorer memory, lower reading ability, and higher levels of impulsivity in 4- and 11-year-old children (Jacobson & Jacobson, 2004). Even postnatal exposure to breast-feeding mothers with high levels of PCBs in their breast milk is linked with lower mental and motor development at 30 months (Walkowiak et al., 2001).

Fathers' exposure to environmental toxins can have harmful effects on a developing fetus also. Men who work in occupations that expose them to toxic substances such as radiation, anesthetic gases, mercury, or lead may develop chromosomal abnormalities that may affect their fertility or increase the risk that their wives will miscarry or bear infants with birth defects (Merewood, 2000). Both wives and husbands planning to have a child should monitor their exposure to environmental toxins.

MEDICAL INTERVENTIONS IN PREGNANCY AND CHILD-BIRTH

Because even normal pregnancies and deliveries are not without discomfort, physicians may prescribe drugs or diagnostic procedures to alleviate such problems. But sometimes, these, too, have proven dangerous.

diethylstilbestrol (DES) A synthetic hormone once prescribed for pregnant women to prevent miscarriage but discontinued when cancer and precancerous conditions were detected in their children.

Some Therapeutic Disasters   Between 1947 and 1964, the synthetic hormone **diethylstilbestrol (DES)** was often prescribed to help prevent pregnant women from miscarrying. Tragically, this drug turned out to be anything but therapeutic, for in the late 1960s scientists discovered its delayed effects. Many female offspring of the perhaps 2 million U.S. women who had taken DES during pregnancy developed vaginal abnormalities, cancer of the cervix in adolescence and increased risk of breast cancer (Nevin, 1988; Titus-Ernstoff et al., 2006). In addition, these young women experienced a high rate of problems in pregnancy, including spontaneous abortion, premature deliveries, and babies with low birthweight (Kaufman et al., 2000; Linn et al., 1988). Moreover, the sons of women who used DES during pregnancy also sustained damage to the reproductive tract, such as seminal fluid abnormalities (Giusti et al., 1995; Wilcox et al., 1995).

thalidomide A drug once prescribed to relieve morning sickness in pregnant women but discontinued when found to cause serious fetal malformations. Current controversy surrounds its possible use in treating symptoms of such diseases as AIDS, cancer, and Hansen's disease (leprosy).

Another therapeutic tragedy in the early 1960s made the public keenly aware of the devastating effects of drug use by pregnant women. **Thalidomide**, an antianxiety and antinausea drug, was prescribed by many physicians to relieve women's symptoms of morning sickness. Their children were sometimes born with abnormalities that included deformations of the eyes, nose, and ears; cleft palate; facial palsy; and fusing of fingers and toes, as well as dislocations of the hip joint and malformations of the heart and the digestive and genitourinary tracts. The most characteristic deformity was something called *phocomelia*, in which limbs were missing and the feet and hands were attached directly to the torso in a way that to many resembled flippers (Moore & Persaud, 1998).

It was extremely difficult when these types of abnormalities appeared for doctors and scientists to figure out that these drugs were causing birth defects. This is because the pregnant women themselves showed no adverse effects from the drugs, and in the case of thalidomide, only a small percentage had children with deficits. And the animal studies that led up to the production of these drugs did not always produce adverse effects in offspring. Today, diethylstilbestrol is still on the market but is recommended only for the alleviation of symptoms in advanced breast and prostate cancer, and thalidomide is available only for the treatment of cancer and of other illnesses such as AIDS and Hansen's disease (leprosy).

Other drugs that are commonly administered to pregnant women for therapeutic reasons may have deleterious effects as well. Maternal ingestion of reserpine, a tranquilizer, may lead to respiratory problems in an infant. Tetracyclines may depress infant skeletal growth. Anticonvulsant drugs may result in the development of cleft lip and palate as well as heart and skeletal defects (Meador et al., 2006). Even aspirin, if taken in high doses by pregnant women, may produce blood disorders in offspring (Vorhees & Mollnow, 1987). Clearly, physicians must use great caution in prescribing drugs for women during pregnancy.

Medications Used in Labor and Delivery In recent years, researchers have focused attention on the effects of local anesthetics, such as the epidural or spinal block, and general anesthetics used to ease pain and to sedate women during labor. Babies of mothers who received large amounts of obstetrical medication during labor show less responsiveness, less smiling, and more irritability for several days after birth, as well as depression, motoric disorganization, and disruptions in feeding responses (Brackbill et al., 1985; Hormann, 2006). They also have impaired attention and motor abilities at 1 month of age but not usually much longer (Emory et al., 1996). The extent to which obstetrical medications affect infants is determined by genetic factors, the mother's general health, the length of labor, the size of the baby, and even the mother's attitude (Lester et al., 1982).

The tragedy of the thalidomide disaster is written on the face of this young Brazilian mother. Her love and her sadness are apparent as she kisses and cradles her newborn son in her arms.

Maternal Factors

Some factors affecting the fetus are directly related to characteristics of the mother herself. In this section, we discuss how a mother's age, number of children, choice of diet, emotional state, and health may affect her unborn child. Table 3-1 gives an overview of this material and Box 3-1 discusses the importance of prenatal health care.

AGE AND PARITY   A woman's age and *parity*, or the number of children she has already borne, may interact in influencing the development of her fetus. Women who have their first child when they are under 15 or over 35 are likely to experience more problems during pregnancy and more complications during delivery than other women. Older women have more difficulty conceiving a child. Indeed, the chance of becoming pregnant declines steadily after age 27, and by age 40, it is less than 5% (among women who are trying to become pregnant). In addition, as Figure 3-3 shows, the incidence of both miscarriage and chromosomal abnormality increases with age of the mother and her reproductive system. Among older mothers, emerging health risks—such as increases in hypertension, diabetes, and alcoholism—rather than age per se contribute to difficulties in pregnancy and birth. Despite the increased

Table 3-1   Maternal characteristics, diseases, and disorders that can have a negative impact on prenatal development

Potential Negative Effects	
Characteristics of the Mother	
Age	Teenage mothers tend to live in risky environments, to neglect their health and diets, and to use drugs, thus raising their risk of delivering premature and low-birthweight babies; older mothers risk bearing a Down syndrome child as well as problems posed by illnesses that are more common as people age.
Diet	Malnourishment can lead to miscarriage, stillbirths, prematurity, low birthweight, physical and neural defects, smaller size in newborns, and sometimes cognitive difficulties.
Emotional state	Mothers who are stressed may have troubled pregnancies, miscarriages, long labor and delivery complications, and more need for childbirth anesthesia; their infants may be hyperactive and irritable and have feeding and sleep problems.
Diseases and Disorders	
Mumps	Infant may suffer malformation of some kind.
Rubella (German measles)	Infant may be born deaf or mentally retarded or have cardiac disorders or cataracts.
Rh factor incompatibility	If mother's and infant's blood types are incompatible (mother's negative, infant's positive), on subsequent pregnancies antibodies produced by mother's blood can kill the fetus.
Hypertension (high blood pressure)	Fetal abnormalities, miscarriage, fetal death.
Diabetes	Preeclampsia or eclampsia, associated with hypertension; possible stillbirth or death of newborn.
Gonorrhea	Infant may be infected in the birth canal.
Syphilis	Miscarriage; if infant survives, it may be born blind, mentally retarded, or have other physical abnormalities.
Chlamydia	Miscarriage or stillbirth; surviving infant may acquire disease in birth process or develop pneumonia or a form of conjunctivitis.
Genital herpes	Infected infant may be blind, mentally retarded, or have motor abnormalities or a wide range of neurological disorders. Half of surviving infants are seriously disabled.
Acquired immune deficiency syndrome (AIDS)	Infants infected often suffer neurological impairments, defects in mental and physical development, microcephaly (small head), and other physical abnormalities. More than half survive beyond 6 years of age, but most eventually die from this disorder.
Toxoplasmosis	Eye and brain damage in the developing baby.

incidence of miscarriage, due in part to the greater likelihood of conceiving a child with chromosomal abnormalities, the vast majority of older women have normal pregnancies and healthy babies (Brockington, 1996). Recent evidence suggests that older fathers may also contribute to poor birth outcomes. Men not only become less fertile as they age but also tend to have more infants with birth defects due to the deteriorating quality of sperm in older men (Lowe et al., 2001; Wyrobek et al., 2006). Clearly, both men and women have biological clocks!

Teenage mothers may have problems with their pregnancies because their reproductive systems are immature, and they are more likely to have unhealthy personal habits, such as the use or abuse of drugs. In addition, they are more often of low socioeconomic status and thus lack both good nutrition and prenatal care, and they tend to live in environments characterized by high rates of disease and environmental pollutants. Studies of young mothers show that they are more likely to have pregnancy complications like *toxemia* (a condition that results from the spread of bacterial products in the bloodstream) and to bear infants with lower birthweights (Smith, 1994). Their children

BOX 3-1

Child Psychology in Action

PRENATAL HEALTH CARE AND INFANT MORTALITY

It seems astonishing that more babies die at or soon after birth in the United States than in 21 countries worldwide (March of Dimes Foundation, 2001). After all, U.S. medicine and technology lead the world. Why, then, are our infant mortality rates so high? The answer is tied in large part to our less than adequate provision of prenatal health care to pregnant women (Children's Defense Fund, 2005).

In any 1 of 10 Western European countries—Belgium, Denmark, England, France, Germany, Ireland, Netherlands, Norway, Spain, and Switzerland—pregnant women automatically receive prenatal and postnatal care at very little cost because it is subsidized by their governments; they also get from 9 to 40 weeks of paid maternity leave from work.

Many pregnant women in the United States face a difficult situation. There are no uniform national standards to guarantee them either consistent high-quality maternity care or, of equal importance, financial coverage. Nationwide, at least 1.3 million U.S. women receive insufficient prenatal care each year, and many of these women are those who need this care most (Healy, 1995). The groups least likely to receive care are teens, unmarried, poor, less educated, recent immigrants, and minorities. These women are at greatest risk of bearing babies with complications such as prematurity and low birthweight.

Reasons women do not seek prenatal care include motivational and multiple social problems (Young et al., 1989). For example, in one study, African American women in particular reported problems with scheduling and keeping appointments for prenatal care as a reason for delaying such care, whereas European Amer-icans often noted that they didn't feel they needed prenatal care. Scheduling difficulties were more often cited by women under age 20 than by older women. Social problems most often cited were unemployment (presumably implying a lack of money), being a single parent, psychological stress, interpersonal conflicts with the baby's father, and family crises. Another reason may be women's fear or dislike of doctors (DiMatteo & Martin, 2001; Kotelchuck, 1995).

Having social support may not guarantee that a woman will seek medical help and guidance during the prenatal period. In one study, researchers found that women who were enclosed within strong, mostly familial networks were less likely to seek prenatal care (St. Clair et al., 1989).

Within the United States, the rates of fetal and neonatal deaths have generally declined, but over the years, the rates for African American infants have remained about twice those for European Americans (Children's Defense Fund, 2005).

What can we do about this situation? The resistance in the United States to national health standards or a national health-care system has been monumental. As a result of this resistance and of the marked discrepancy between the wealthy and poor sectors of the population, many poor mothers either have no access to prenatal care or do not take advantage of opportunities they do have. In view of the costs, both emotional and financial, of high infant mortality and high rates of premature and disabled infants, it is important to make prenatal services widely available to women of all racial, ethnic, and socioeconomic groups.

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are also at risk for delays in developing intellectual, language, and social skills (Moore & Brooks-Gunn, 2002). When teenage mothers have adequate diets and prenatal care, however, they do not show any higher rates of complications in birth or pregnancy than do mothers in their 20s (Moore & Brooks-Gunn, 2002; Smith, 1994). Also, when they live in supportive environments, their infants do not suffer any higher rates of developmental delays. (See Chapter 11 for more discussion of teen parenthood.)

CHOICE OF DIET   It is difficult to separate the effects of maternal malnourishment from those of a variety of other harmful factors. The malnourished mother often lives in an environment characterized by poverty, poor education, inferior sanitation and shelter, and inadequate medical care (Evans, 2004). In the United States,
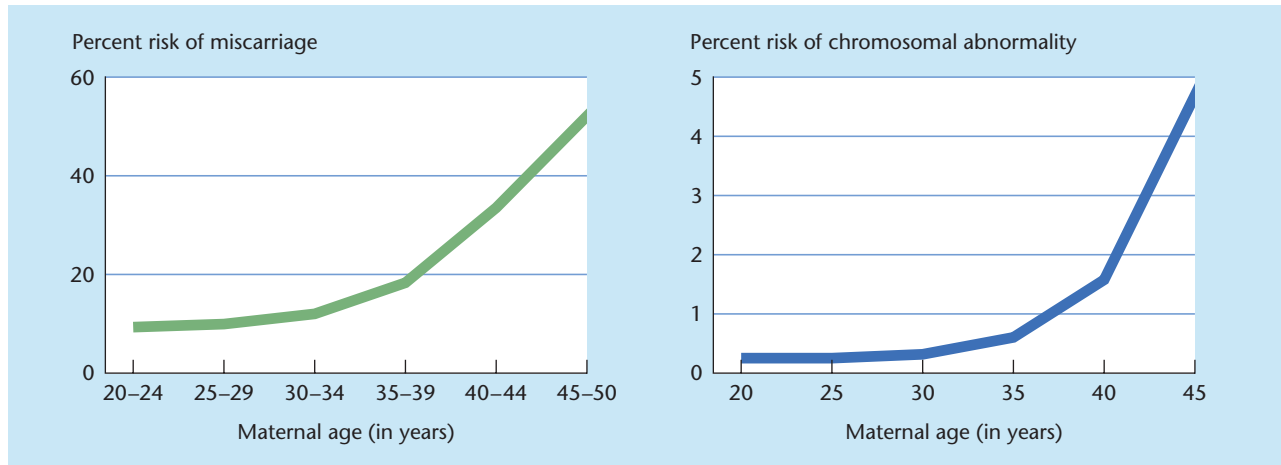
Figure 3-3   Maternal age and reproductive risk

As women age, the risks of miscarriage and of chromosomal abnormalities increase.

Source: From *Time*, April 15, 2002, p. 53. © 2002 Time Inc. reprinted by permission.

malnutrition and high maternal and infant mortality are also associated with ethnicity. African American and Latino families are often poorer than European and Asian American families, and African American and Latina women are more likely to be exposed to these harmful factors and to experience more of their destructive effects.

Studies have shown that gross deficiencies in the diets of pregnant women, especially of some vitamins, minerals, and proteins, are related to increased rates of miscarriage, stillbirth, and infant mortality. Moreover, such deficiencies are likely to lead to prematurity, physical and neural defects, and smaller size in neonates (Shonkoff & Phillips, 2000). The specific form the damage takes depends, again, on the age at which the malnutrition occurs. For example, if the mother takes a supplement of folic acid daily in the last 2 months of her pregnancy, she can reduce her risk of having a premature birth (Scholl et al., 1996). Impairment of a child's intellectual development due to prenatal malnutrition is most likely when the mother's malnutrition has been severe and long-lasting and when dietary deprivation continues after childbirth (Lozoff et al., 2006; Sigman, 1995). Researchers have found that prenatal malnutrition is detrimental for children's social and motor development and cognitive abilities (Lozoff et al., 2006; Riciutti, 1993; Sigman, 1995). Cognitive difficulties may not only be the result of biological changes in the brain but may also be linked with behavioral aspects of malnutrition—lowered energy, inattention, and lack of motivation and responsiveness. Nutrition supplement studies in Jamaica, Indonesia, and Colombia found that both motor and cognitive abilities improved when infants were given enriched diets (Grantham-McGregor et al., 1991).

Finally, the effects on an infant of prenatal malnutrition may be worse if tired, malnourished parents respond to their malnourished and irritable or nonresponsive infant with lack of support or with rejection (Lozoff et al., 2006). For this reason, many successful intervention programs have focused on training economically deprived parents to interact with their children in a more sensitive, involved, and stimulating manner (Campbell et al., 2001).

EMOTIONAL STATE   Stresses during pregnancy can come from a wide array of problems, such as marital discord, disagreement about whether to continue the pregnancy, relocation to a new city, or illness and death of relatives, and these stresses can affect the mothers' emotional state and, in turn, her baby. A pregnant woman's emo-

tionality can lead to metabolic or biochemical changes that affect the fetus. In fact, fetal stress hormones reflect those of the mother (DiPietro, 2004; DiPietro et al., 2006). Studies have found that women who suffer sustained emotional distress tend to experience complications during pregnancy and delivery, including nausea during pregnancy, spontaneous abortion, prolonged labor, and greater need for anesthesia during childbirth (Monk et al., 2000; O'Connor et al., 2005).

Women who are anxious and under emotional stress during pregnancy also tend to have infants who are physically more active in utero. After their birth, these infants tend to be hyperactive and irritable, to cry more, and to have feeding and sleep problems (Van Den Bergh, 1992), and they are less attentive at 8 months than other babies (Huizink et al., 2004). At the age of 7 years, they are more likely to exhibit behavioral difficulties, depression, and anxiety (O'Connor et al., 2005).

In an even more dramatic example, infants born in the Netherlands to mothers who were pregnant during the German invasion of the country in World War II were more likely to develop schizophrenia than adults born in earlier or later years (van Os & Selton, 1998).

A woman's emotional distress during pregnancy may be temporary, or it may signal ongoing difficulties and be reflected in the way these women handle their infants after birth. The effects of stress may be reduced by the support available during pregnancy (Brockington, 1996; DiMatteo & Kahn, 1997). In one study, when pregnant women were under severe life stresses, those with supportive relatives and friends had only a 33% rate of complications in pregnancy and childbirth compared with a 91% rate for women lacking social support (Nickolls et al., 1972). The effects on labor and delivery of the presence of a supportive companion are evident in a study of healthy Guatemalan women (Sosa et al., 1980). In this study, women in the experimental group were assigned a *doula*, a supportive female companion who talked to them, reassured them, rubbed their backs, and held their hands until delivery. The control group went through the normal hospital routine with no supportive person present. The mean length of labor was 19.3 hours for the control group and 8.7 hours for the women who had supportive companions. The latter also had fewer complications, such as the need for cesarean sections, and their infants were less likely to experience fetal distress. The presence of a trained, supportive companion has been found to have similar benefits for women having babies in U.S. hospitals (Kennell et al., 1991).

Fathers' presence during labor and delivery also has a beneficial effect on mothers, reducing their pain and their need for medication and making their view of the birth experience more positive (Lindell, 1988; Parke, 2002). However, the presence of the father alone may be less effective in reducing the need for cesarean deliveries than the presence of both the father and an experienced support figure (Kennell & McGrath, 1993). Fathers' presence may be helpful, but they may need more training and support if they are going to be as effective as more experienced support figures, such as doulas or nurses.

DISEASES AND DISORDERS   A wide range of maternal diseases and disorders can affect an infant's development prenatally or during the birth process. Like

Sharing the joy of their baby's first hours of life is an experience many mothers and fathers treasure.

the effects of other teratogenic agents, the effects of these disorders depend on their timing. For example, if the pregnant woman contracts the viral disease *mumps* during her first trimester, her infant is much more likely to suffer some kind of malformation than if she contracts the disease later in her pregnancy. If a woman contracts *rubella* during the first month of her pregnancy, her fetus risks cardiac disorders, cataract formation, deafness, and mental retardation; if she contracts this illness in her third month or later, however, the likelihood that her infant will suffer disability declines substantially (Cochi et al., 1989; Eberhart-Phillips et al., 1993).

Timing is also an issue in the potentially life-threatening condition of **Rh factor incompatibility**, in which an infant's blood is Rh positive and the mother's blood is Rh negative. (Rh factors are antigens, or substances in the blood that can induce specific immune responses.) Because positive and negative blood types are incompatible, if by some chance fetal and maternal blood commingle (as we've said, normally they do not), the mother's blood could produce antibodies that would attack the fetal blood cells, bringing about the death of the fetus. Because such antibodies are scarce in a woman who is pregnant for the first time, Rh incompatibility is not an issue during a first birth. To prevent it from ever becoming an issue, Rh immune globulin can be administered to the Rh negative mother after the birth of each Rh positive child to prevent antibody formation and ensure the birth of other healthy children (Turner & Rubinson, 1993).

Other maternal conditions that may increase rates of fetal abnormalities, miscarriage, and death include *hypertension*, also known as high blood pressure, and *diabetes.*

PARASITIC AND BACTERIAL INFECTIONS   Parasitic infections, such as **toxoplasmosis**, which is acquired by eating undercooked meat or by contact with feces, as in handling cat litter, can affect the infant. Transmitted through the *placenta*, toxoplasmosis can cause eye and brain damage in a developing baby.

Bacterial infections can also cause problems for the infant. **Gonorrhea**, which is spread for the most part by direct sexual contact with an infected person, can cause *pelvic inflammatory disease* in the woman, and this can cause an *ectopic*, or tubal, pregnancy. In an ectopic pregnancy, the zygote implants in the woman's fallopian tube rather than in her uterus, and the pregnancy must be terminated to save the mother's life (Turner & Rubinson, 1993). Gonorrhea in the mother can also infect an infant as it passes through the birth canal. If not treated, the disease can cause blindness; for this reason, in most hospitals in the United States, a few drops of silver nitrate or penicillin are placed in the eyes of newborns to prevent infection.

Some chronic bacterial infections invade the developing embryo and remain active but do not exert their worst effects until later in development. For example, the harmful effects on the fetus of maternal **syphilis** do not occur before 18 weeks of gestation, and therefore, early treatment of a syphilitic mother may avert abnormalities in the child. If the mother is untreated, however, invasion of the fetus by bacteria from the mother may result in spontaneous abortion, blindness, mental disability, or other physical abnormalities. Moreover, in some cases, the negative effects of syphilis are not apparent at birth but emerge gradually during the early years of development. In this case, they are expressed in the form of deterioration in thought processes, judgment, and speech; a decline in motor and mental abilities; and eventually, death. Although years ago syphilis was virtually a death sentence, today it can be cured if detected and treated early with antibiotics. Nevertheless, currently about 1 of every 2,000 newborns is infected with syphilis (National March of Dimes Foundation, 2001).

Chlamydia is probably the most widespread bacterial infection among sexually transmitted diseases. Babies born to women with this infection often acquire it in the birth process and may develop pneumonia or a form of conjunctivitis. Mothers with chlamydia also risk spontaneous abortion and stillbirth. In addition, like gonorrhea, chlamydia can lead to pelvic inflammatory disease.

Rh factor incompatibility A condition in which an infant's Rh-negative blood opposes its mother's Rh-positive blood and threatens fetuses in later births, when the mother's body has had time to produce antibodies that will attack fetal blood cells.

toxoplasmosis A parasitic disease acquired by eating undercooked meat or by contact with feces, as in handling cat litter.

gonorrhea A sexually transmitted bacterial infection that, in a pregnant woman, can cause blindness in her infant; normally treatable with antibiotics.

syphilis A sexually transmitted bacterial disease that can usually be treated with antibiotics, but if untreated in the pregnant woman, can cause miscarriage or blindness, mental retardation, or other physical abnormalities in her baby.

chlamydia Probably the most widespread bacterial sexually transmitted disease; can cause pneumonia or a form of conjunctivitis in a pregnant woman's baby.

VIRAL INFECTIONS   One of the most common sexually transmitted diseases is **genital herpes**. Of the approximately 4 million babies born in the United States each year, between 1,500 and 2,200 are infected with herpes (National March of Dimes Foundation, 2001). The risk is especially great if the mother is having an active out-break of herpes and the infant is exposed to the virus in the birth canal. If a herpes infection is detected in a pregnant woman before labor, a cesarean delivery will usu-ally succeed in preventing the infant from coming into contact with the disease and thus protect it from contagion. Herpes can also be transmitted by exposure to the virus after birth, although this occurs less frequently. Because an infant does not have a fully developed immune system before 5 weeks of age, if it is infected with herpes, the dis-ease can cause blindness, motor abnormalities, mental retardation, and a wide range of neurological disorders. Sixty percent of these babies will die; roughly 90% of the babies who survive are left with serious problems, including skin and mouth ulcers and eye and brain infections. Nearly half have major developmental disorders (Healy, 1995; National March of Dimes Foundation, 2001).

Of course, the viral infection that has caused the greatest alarm in recent years is the *human immunodeficiency virus (HIV)* infection and its expression in **acquired immune deficiency syndrome (AIDS)**. In the absence of treatment, an infected preg-nant woman has about a 25% chance of transmitting the AIDS virus to her child. Most are infected prenatally—by passage of the virus through the placenta during gestation or the birth process—but drinking the mother's milk after birth can also infect infants. However, through the use of antiretroviral drug therapy and a caesar-ean delivery, the rate of transmission is reduced to 1% (Coovadia, 2004). In 2005, around 700,000 children under age 15 contracted HIV, mainly through mother-to-child transmission; the majority of the infected children reside in sub-Saharan Africa (UNAIDS, 2006).

Children with AIDS often suffer neurological impairments, delays in mental and physical development, and such structural deformities as *microcephaly*, or an unusually small head, a square forehead, and widely spaced, slanted eyes. Of greater significance is the fact that AIDS is an autoimmune disease, or one in which the body's immuno-logical forces are disabled and/or attack the body's healthy cells. Thus, these children are vulnerable to disease and infections of all sorts that may cause their early deaths (Centers for Disease Control and Prevention, 2007). Children with HIV/AIDS and their families are desperately in need of specialized care and support systems and, without external assistance, remain highly vulnerable.

genital herpes A common viral infection spread primar-ily through sexual contact; if contracted by an infant during birth, it can cause blindness, motor abnormali-ties, mental retardation, and a wide range of neurological disorders.

acquired immune deficiency syndrome (AIDS) A viral disease that attacks the body's immune systems; transmitted to a fetus or newborn in the form of the *human immu-nodeficiency virus (HIV)*, this disorder weakens the child's immune system and may ulti-mately cause its death.

BIRTH AND THE BEGINNINGS OF LIFE

Birth is one of the most dramatic and significant events in the lives of parents and chil-dren. For parents, the last few weeks of pregnancy are typically characterized by joyous anticipation and, especially in first births, by apprehension about labor and childbirth, anxiety about whether the child will be normal, and concern about whether the mother will be permanently altered physically by pregnancy and delivery. Although the pro-cess of birth exhausts both parents, most are exhilarated, even awestruck, in seeing and holding their newborn for the first time.

Labor and Delivery

Birth is a momentous physical and social transition for the infant. The baby moves from the warm, wet environment of the uterus to the cooler, dry, bright environment of the external world full of lights, objects, movements, touches, voices, and faces. Even

before birth, the parents and child have established a relationship, and following birth this relationship becomes more intense and complex.

THE THREE STAGES OF CHILDBIRTH   Birth involves a series of changes in the mother that permit the infant to move from the womb out into the external world. Figure 3-4 shows the way the fetus appears and is positioned in the uterus just before labor begins as well as the three stages in the birth process.

The first stage of labor begins as the mother experiences regular uterine contractions that are usually spaced at 10- to 15-minute intervals; these contractions become more intense and frequent as labor progresses. This first stage, which generally lasts between 8 and 14 hours for firstborn children and half that for later-born children, concludes when the cervix is dilated sufficiently to permit the infant's head to pass through it and into the vaginal canal.

In the second stage of labor, which usually lasts less than an hour, the infant descends through the birth canal and is delivered through the vaginal opening.
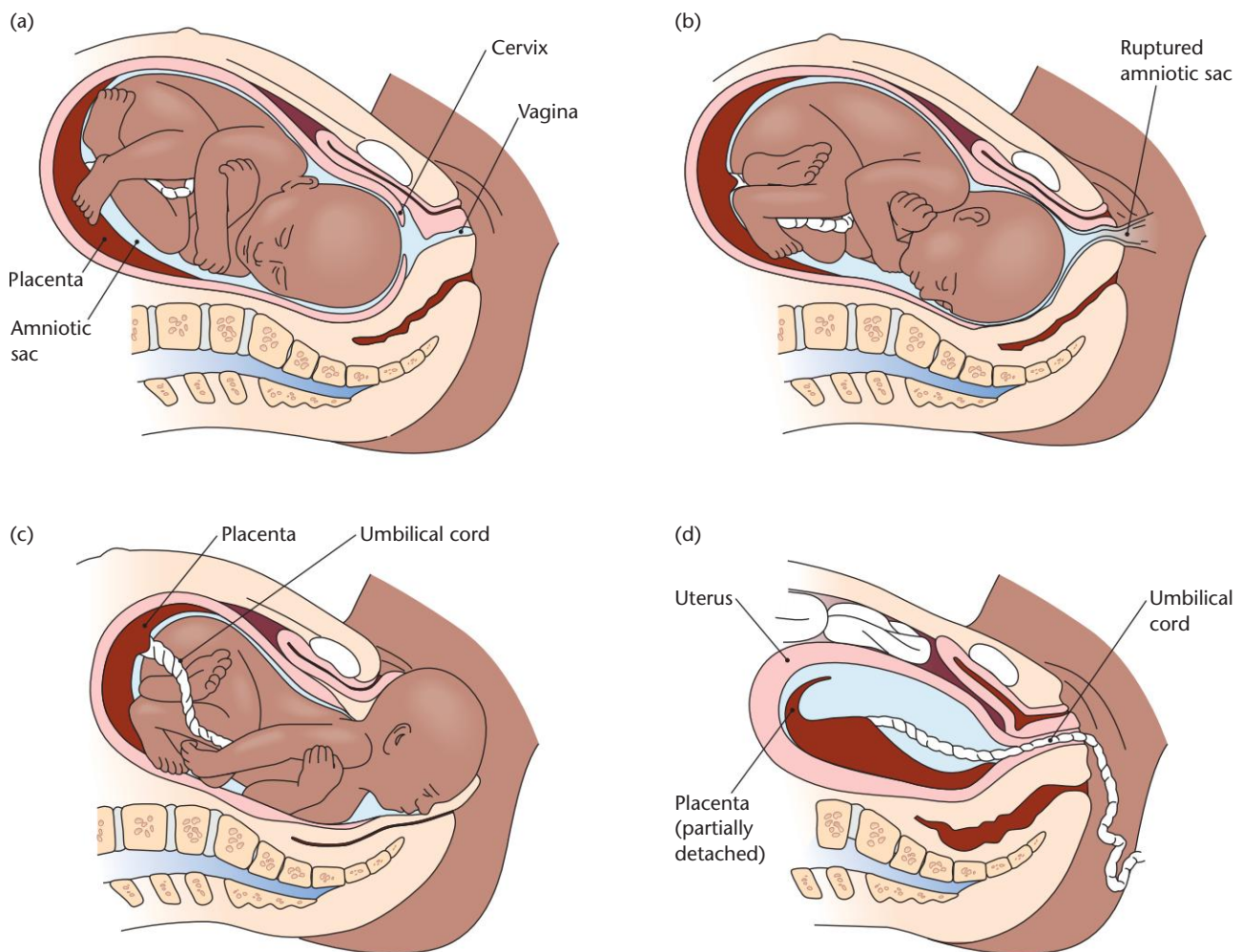
Figure 3-4   The stages of the birth process

With arms and legs folded and head pointed toward the birth canal, the fetus is ready to be born (a). In stage 1, the fetus moves toward the cervix as it gradually dilates (b). In stage 2, the fetus moves through the vaginal opening (c). In stage 3, the nourishing placenta detaches from the uterine wall preparatory to expulsion (d).

Source: Adapted from Vander et al., 1994.

The third and final stage of birth takes only a few minutes, as the uterus expels the placenta.

NATURAL CHILDBIRTH: NOT SUCH A NEW IDEA

Having a baby in the relatively isolated and unfamiliar setting of a hospital, separated from one's relatives and often from one's husband, was a practice that began in the nineteenth century as a response to a rise in health problems and in infant and maternal mortality associated with rapid urbanization and industrialization. Before that time, and still in many regions of the world, women gave birth in their homes, attended by relatives or a midwife.

Currently, physicians attend about 92% of births by U.S. women (Centers for Disease Control and Prevention, 2000). However, increasingly, birth is becoming a shared family experience and occurring in the home or in homelike birthing centers. A common preparation for childbirth is the Lamaze method. The Lamaze childbirth technique uses breathing and muscle relaxation exercises to teach women how to manage the pain of labor and delivery. Many couples take classes during pregnancy to learn these techniques. Fathers are taught to help their partners with the relaxation procedures and to be a relaxation and breathing coach during the labor and delivery process.

The presence of a supportive partner, in combination with the Lamaze breathing techniques, does, in fact, lead to easier labor and delivery. Mothers who choose to take Lamaze classes experience shorter labor, require less medication, and are less stressed and more positive about the birth experience (Mackey, 1995; Wilcox et al., 1997). Midwife-assisted births (nearly 10%) have increased nearly 800% since the early 1970s (Carmichael, 2004). Home deliveries by trained personnel or delivery in a birthing center is suitable for normal births; however, between 15% and 25% of women who begin labor in such settings are subsequently moved to a hospital because of birth complications (Olsen, 1997). Many recent trends in home birthing go back to ancient times. The kneeling position, which some modern women prefer, was favored by native Hawaiian women up to the twentieth century, and the birthing stools that are gaining popularity in the United States are modeled after stools designed 4,000 years ago in Egypt (Carmichael, 2004).

CESAREAN DELIVERY

The **cesarean delivery**, in which a baby is removed from the mother's uterus through an incision in her abdomen, is performed in a variety of situations. Labor may be unusually slow or prolonged, the baby may be in difficulty, there may be vaginal bleeding, or the baby's position may make a normal vaginal delivery impossible (e.g., the baby's feet may be in position to deliver first, or the baby may lie horizontally in the uterus). From the 1960s to 2005, the rate at which cesarean deliveries were performed increased from 5% to 30% of all births in the United States (National Center for Health Statistics, 2006), and the rate is approximately 20% in Britain and Canada. There are several reasons for this increase, including the convenience of physicians, convenience of patients, and an effort to minimize physician liability associated with the potential complications of vaginal delivery. Concerns have been raised that the rate of cesarean deliveries is unnecessarily high and that these procedures themselves may have unforeseen long-term adverse consequences.

Cesarean births place mothers at greater risk of infection and involve longer hospital stays (Liu, 2007) as well as problems such as an increased risk of preterm and low-birthweight infants with a subsequent birth (Kennare, 2007). In addition, cesarean babies are exposed to more maternal medication during delivery; as a result, they have somewhat more trouble breathing and are less responsive and wakeful than other newborns, and in turn, breastfeeding may be more difficult (Emory et al., 1996). However, short-term studies of cesarean births suggest that this method of delivery has few effects on infants' cognitive or neurological development (Entwisle & Alexander, 1987). Moreover, recent longer term evidence indicates that babies delivered by cesarean did not have higher rates of hospitalization or outpatient visits during their first 18 months

cesarean delivery The surgical delivery of a baby; the baby is removed from the mother's uterus through an incision made in her abdomen and uterus in a procedure also known as *cesarean section.*

Sign	Score		
	0	1	2
Heart rate	Absent	Less than 100 beats per minute	100 to 140 beats per minute
Respiratory effort	No breathing for more than 1 minute	Slow and irregular	Good respiration with normal crying
Muscle tone	Limp and flaccid	Some flexion of the extremities	Good flexion, active motion
Reflex irritability	No response	Some motion	Vigorous response to stimulation
Color	Blue or pale body and extremities	Body pink with blue extremities	Pink all over

of life (Leung et al., 2007). Although early mother-child interactions may be adversely affected, by the time the children are a year old, these relationships are positive (Reilly et al., 1987). One advantage of cesarean births is that because mothers have a longer recovery period, during which it is often difficult for them to handle all the caregiving of their infants, fathers may become more involved than usual with their babies in the first few months (Parke, 1996).

BIRTH COMPLICATIONS   Although labor and childbirth are normal processes in human development and, in the majority of cases, go smoothly, sometimes there are complications. We've seen that sexually transmitted diseases can be passed to the infant as it moves through the birth canal. In addition, it has been found that more males than females are born with physical anomalies. This has been attributed in part to the role of the sex chromosomes (see Chapter 2) and in part to the larger size of, and hence greater pressure on, a male's head during birth. The majority of infants do not suffer serious impairment at birth, however. Fewer than 10% have any type of abnormality, and many of these difficulties disappear during subsequent development.

To assess the condition of the newborn infant after birth and check for any problems, doctors often use the Apgar scoring system, named for its developer, anesthesiologist Dr. Virginia Apgar (Table 3-2). At 1 minute and 5 minutes after birth, the doctor or nurse measures the heart rate, respiratory effort, reflex irritability, muscle tone, and body color of the infant. Each of the five signs is given a score of 0, 1, or 2; the higher the score attained, the more favorable the baby's condition. A total score of 7 to 10 indicates that the newborn is in good condition, whereas a score of 4 or lower alerts medical staff to the need for immediate emergency procedures.

Prematurity and Low Birthweight

preterm A term describing a premature baby who is born before its due date and whose weight, although less than that of a full-term infant, may be appropriate to its gestational age.

small for date A term describing a premature baby who may be born close to its due date but who weighs significantly less than would be appropriate to its gestational age.

Premature or **preterm** babies are those born before they have completed the normal or full-term gestational period, at 37 weeks after conception or less. About 9% of infants are born prematurely. On average, they weigh less than 5.0 pounds, which is a low birthweight compared with the 7.7 pound weight of a normal full-term baby. Infants whose weight is *less* than appropriate for their time in utero are called **small-for-date** babies. Although babies who weigh less than 3 pounds, because they are preterm or because they are small for date, have many odds against them, modern technology is increasingly successful in enabling them to survive (Goldberg & DeVitto, 2002; McIntire et al., 1999). (See Table 3-3 for a summary of types of preterm babies.)

In the United States, African American mothers are twice as likely as European American women to have babies of low birthweight (less than 5.5 pounds) and almost three times as likely to have babies of very low birthweight (less than 3.3 pounds).

Description	Timing of Delivery	Average Weight at Delivery
Full Term	Average of 38 weeks from conception	7.7 lb (3,500 g)
Premature		
Preterm	Several weeks before due date	Less than 5.5 lb (2,500 g), but weight is often appropriate to time spent in utero
Small for date	Either at about due date or several weeks before	Less than 5.5 lb (2,500 g) and less weight than would be expected for time spent in utero; survival of babies who weigh less than 3.3 lb (about 1,500 g) is severely compromised

Table 3-3

Preterm and small-for-date babies

Mexican American women's chances of having such babies are about halfway between these two groups (Goldberg & DeVitto, 2002). Several factors account for the higher risk of prematurity among minority women; among these are poor diet, inadequate prenatal care, and drug and/or alcohol use. However, premature and low-birthweight babies are also more common in multiple births, which often result from reproductive technologies that are used more often by affluent European American women.

Being born prematurely sometimes results in developmental delays, but it does not necessarily mean that the child will have long-term problems. As one mother observed about her preemie, "The doctors kept telling me he'd catch up. It took years, but eventually he did" (Tracy & Maroney, 1999, p. 214). Having a very low birthweight is more often associated with intellectual impairment. Although most low-birthweight babies catch up in motor and intellectual development by the time they are 4 years old, about 15% of those who weigh less than 3.3 pounds and about 30% of those who weigh less than 2 pounds at birth continue to show some cognitive deficits (Goldberg & DeVitto, 2002).

Problems in academic achievement, hyperactivity, motor skills, and speech and hearing disorders occur more often in very-low-birthweight babies than in normal infants (Anderson et al., 2003; Goldberg & DeVitto, 2002). However, it is not clear to what extent these problems are the consequence of low birthweight and to what extent they are the outcome of a number of other, possibly related, factors, such as delivery complications, experiences in the NICU (Newborn Intensive-Care Unit), neonatal anomalies other than prematurity, and the way parents respond to their infant's apparent frailty and small size (Field, 1990; Korner, 1989). When these high medical risks are compounded by adverse environmental circumstances, long-term developmental difficulties are most likely (Goldberg & DeVitto, 2002).

STIMULATION PROGRAMS FOR PREMATURE BABIES

Researchers have experimented to improve the environments of premature and low-birthweight babies by administering extra stimulation. Some have provided stimulation that approximates the conditions the baby would have experienced in utero—for example, tape-recorded heartbeats (Barnard & Bee, 1983), rocking hammocks (Neal, 1968), and waterbed mattresses (Burns et al., 1983), which presumably simulate the rotation, movement, and rhythmic activity the fetus would have experienced within the amniotic sac. Other investigators have used stimulation characteristic of the experiences of full-term infants, such as mobiles, tape recordings of the mother's voice, talking and singing, and cuddling and stroking (Field, 2001; Field et al., 2007; Goldberg & DeVitto, 2002). Both approaches have shown positive results (see Box 3-2).

As Figure 3-5 shows, stimulated premature infants are more advanced than unstimulated premature infants in physical development (Field et al., 2007). They are also more advanced in neurological development as measured by reflexes, in sensorimotor and motor skills, in muscle tone, in weight gain, and in exploratory behavior (Field et al., 2007; Goldberg & DeVitto, 2002). In addition, fewer incidents of *apnea* (temporary cessation of breathing, associated with later crib deaths) occur in stimulated infants

BOX 3-2

Child Psychology in Action

OF BABIES AND BEARS AND POSTNATAL CARE

Most babies go home from the hospital to brightly decorated rooms and cribs filled with soft, squishy stuffed animal companions. Now some premature infants are sleeping with such companions in the NICU—a teddy bear from whose gentle "breathing" they may derive considerable benefit.

In most programs designed to stimulate premature infants, the stimulation is imposed on the infant whether she or he wants it or not. Evelyn Thoman (1987, 2005) designed a clever study to investigate whether premature infants can actively seek and regulate stimulation, rather than just being its passive recipients, and whether stimulation instigated by the infant would facilitate the infant's developmental progress.

Thoman placed a "breathing" teddy bear in the cribs of one group of preemies, a nonbreathing teddy bear in the cribs of another group, and gave a third group no teddy bears. She began her original study when the infants were 32 weeks old (counting from conception), 6 to 8 weeks younger than full-term newborns.

She continued her intervention for 3 weeks, until the babies were 35 weeks old.

The design of the breathing bear included a pneumatic pump that enabled it to "breathe" at a rate that could be individualized for each infant. Each bear's breathing rate was set at half of the infant's quiet-sleep respiration rate (Thoman et al., 1995) on the theory that because premature babies have relatively fast respiration rates (about 60 breaths per minute in quiet sleep), such a rate might be too fast for gentle stimulation. Each infant controlled the amount of stimulation it received and the period of time the stimulation continued because it could either stay in contact with the bear or move away from it.

Thoman found that babies spent 63% of their time in contact with the breathing bear and 13% of their time with the nonbreathing bear. Infants who had no bear spent 17% of their time in the area occupied by bears in the cribs of the two other groups of infants.

Even these very young, premature babies were able to approach an available and attractive form of stim-

Figure 3-5

Everyone likes massage, including premature babies

A group of premature infants were given three 15-minute massages daily for 10 days, while another group received no massage. The infants given extra stimulation averaged 47% more weight gain per day, were awake and active more of the time, showed more mature behaviors on the Brazelton Neonatal Scale, and were in the hospital for 6 days fewer than the other infants. Moreover, 6 to 8 months later, the first group weighed more and performed better on the Bayley mental and motor scales than the second group.
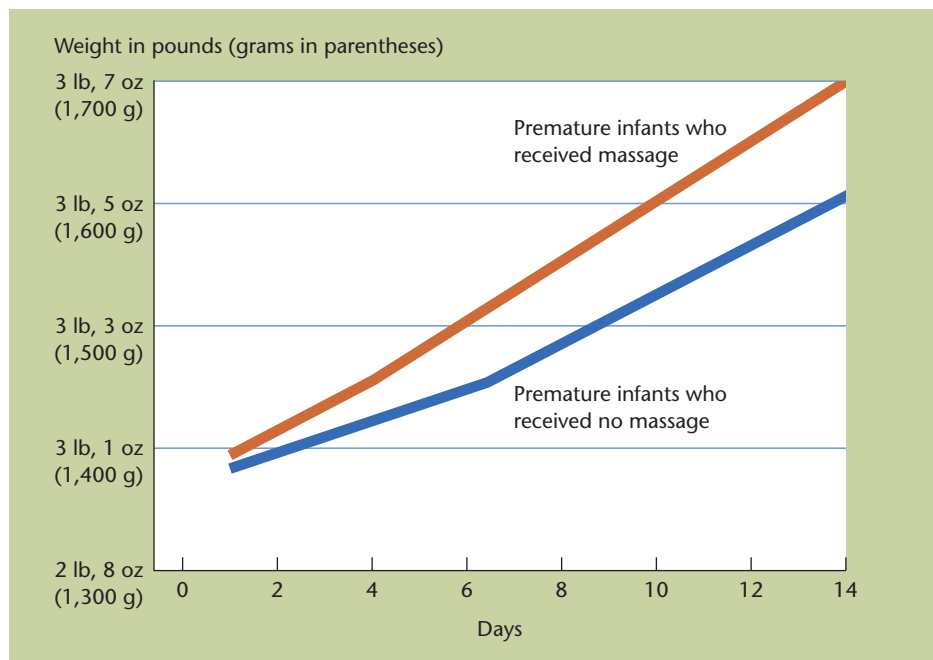
As this newborn snuggles up to a "breathing bear," it seems clear that the baby derives comfort from the bear's presence. This bear was designed by Evelyn Thoman for her studies of premature infants, who proved to benefit from the regulatory effects of the simulated breathing sounds.

ulation, and they clearly preferred the stimulation offered by the breathing bear to the passivity of the nonbreathing bear. Furthermore, the premature babies with the breathing bear showed more even respiration and more quiet sleep than did infants in the other two groups. Thoman (2005) speculates that this is because the additional stimulation may have influenced the organization of brain processes associated with mature sleep patterns. The breathing bear enabled more quiet sleep not only during the intervention but also several weeks after the intervention ended. Babies with breathing bears also showed less waking and quieter sleep, fewer startles in quiet sleep, and less crying. They were also more likely to smile than grimace during active sleep than babies with nonbreathing bears. The breathing bear was good for mothers, too: Mothers whose infants had the breathing bears were less depressed and stressed than mothers in the nonbreathing bear group (Novosad & Thoman, 2003).

(Korner, 1989). Stimulation clearly has at least a short-term positive effect on the development of premature infants, although long-term gains are rarely found (Field et al., 2007; Korner, 1989).

However, programs must be sensitive to individual differences (Als et al., 2003); not all premature babies benefit from additional stimulation. Children who are ill, who have intensive medical care routines that disrupt their sleep, or who are being weaned from breathing assistance or other physical support systems may not respond positively or may actually be distressed by added stimulation (Oehler et al., 1988).

PREMATURE BABIES AND PARENTAL CONTACT Another type of intervention to help premature and low-birthweight infants is to facilitate parents' contact with the infants. Some mothers of premature babies report feelings of guilt, failure, and alienation from their infants and loss of self-esteem, and they appear apprehensive about handling and caring for their fragile-appearing infants. When mothers of preemies are eventually able to take their babies home from the hospital, they tend to show less emotional involvement with them than do mothers of full-term babies (Goldberg & DeVitto, 2002). Their infants sometimes fail to gain normal weight and height, and they are at risk of becoming battered or failure-to-thrive children (Bugental & Happaney, 2004). Premature babies' typical physical appearance, small size, high-pitched cry, feeding difficulties, and low responsiveness may make them unappealing and increase their parents' frustration. In addition, most premature infants are born to mothers who are poor, young, and uneducated (Brooks-Gunn et al., 2000), although

BOX 3-3

Risk and Resilience

WHAT FACTORS HELP CHILDREN OVERCOME EARLY ADVERSITY?

At the time that Emmy Werner and her colleagues began their longitudinal study of children born on the Hawaiian island of Kauai, there was considerable literature on children born with serious defects or disorders and the course their lives were expected to take. However, research on those factors that protect children and enable at-risk children to develop a degree of resilience was still in its infancy (Aldwin & Werner, 2007; Werner, 1995). Werner's study, which has followed nearly 700 participants for more than 40 years, was one of the first to focus on such questions as: What is *right* with the children who develop resilience? And how can we help other children to acquire this same near-invincibility in the face of severe adversity?

When the participants in the Kauai Longitudinal Study were born, 47% suffered birth complications, and of these, 33% were classified as being "at risk." In addition to experiencing moderate to severe birth complications, these children were born into poverty, their mothers had little formal education, and their family environments were characterized by discord, desertion, divorce, alcoholism, or mental illness. Despite these early stresses, fully 33% of this at-risk group developed into confident, competent, and caring young adults.

As toddlers, the children who matured into resilient young adults were alert, autonomous, and more advanced in communication, self-help, and motor skills. They tended to seek out novel stimuli and had a positive social orientation.

The main effects of problems caused by perinatal complications occurred early in a child's development; after that, development was increasingly influenced by environmental circumstances such as chronic poverty, family instability, and mental health problems. By the age of 10, the effects of environmental variables had almost obliterated those of perinatal damage: No relation was found between measures of birth complications and a child's IQ score.

When they were 18, resilient children in families of low socioeconomic status seemed to share four personality characteristics: an active, resourceful approach toward solving life's problems; a tendency to perceive even their painful experiences constructively; the ability to gain other people's positive attention; and a strong ability to use faith to maintain a positive vision of a meaningful life (Werner, 1984). Evidencing cognitive abilities such as effective reading skills by the fourth grade served as an additional protective factor (Werner, 1995). Finally, certain features of these children's social environment served as protective buffers: small family size, favorable parental attitudes, a continuous relationship with a caring adult (not necessarily the parent), low levels of family conflict, a smaller load of stressful life experiences, and the availability of counseling and remedial assistance. In addition, in middle childhood or

there has been an increase in premature and multiple births among middle-class women associated with new reproductive technologies that are used to boost fertility (see Box 2-2 from the previous chapter).

When hospital personnel purposely increase the amount of contact, particularly skin-to-skin contact, that mothers have with their premature infants, this can improve mother-child relations (Klaus & Kennell, 1982), increase maternal self-confidence and sensitive parenting (Klebanov et al., 2001), and improve infant sleep patterns and cognitive development (Feldman & Eidelman, 2003; Tessier et al., 2003).

LONG-TERM EFFECTS OF PREMATURITY   Long-term effects of prematurity are more marked and enduring for children in economically disadvantaged families than in middle-income families (Bradley et al., 1994; Klebanov et al., 2001). When effects on parent-child relations or on the child's cognitive development do endure, they seem to be due to a host of factors in addition to prematurity: the child's responsiveness, the mother's competence, the family's environmental stresses, and the kind of support available to the parents from family members, nursing staff, and self-help groups (Gross et al., 1997).
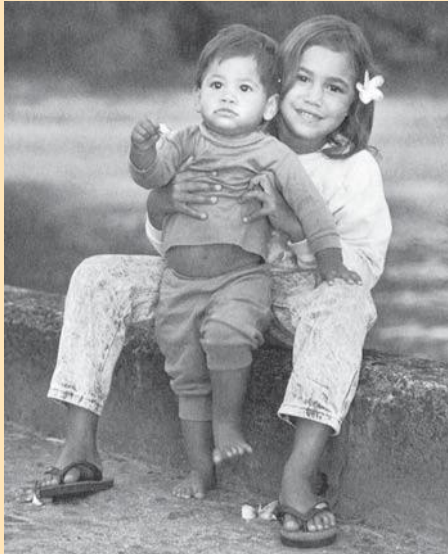
Thanks both to their own resilience and to environmental supports such as healthy child-rearing practices, fully a third of the at-risk children studied by Emmy Werner and her colleagues developed into self-confident, successful adults. These children had a positive and active approach to problem solving, the ability to see some useful aspects of even painful experiences and to attract positive responses from other people, and a strong tendency to use faith in maintaining an optimistic vision of a fulfilling life.

adolescence, resilient children often assumed responsibility for the care of another person—a sibling, aging grandparent, or an ill or incompetent parent. Both such "required helpfulness" and being cared for oneself were critical in protecting these high-risk children from adversity (Werner, 1984, 1995).

At age 30, among the resilient adults who were parents, their primary goals for their children were the acquisition of personal competencies and skills. About three quarters considered themselves happy and satisfied; a few had divorced, had experienced psychological problems requiring them to seek professional help, or had drug problems (Werner, 1995; Werner & Smith, 2001). Ten times more of the study participants had problems related to the effects of poor environment than to the effects of perinatal stress. Indeed, birth complications, unless they involved serious damage to the central nervous system, were consistently related to impaired physical or psychological development only if they were combined with chronic poverty, parental psychopathology, or persistently poor rearing conditions (Aldwin & Werner, 2007; Luthar, 2007; Selman & Dray, 2006). Clearly, the environment plays a critical role in helping children overcome a poor beginning.

The stress of raising a premature baby may also have a negative effect on relations between the parents. Some research has reported a high incidence of marital discord in the first 2 years following a premature birth (Leiderman, 1983); however, if a couple views their coping strategies as complementary and if they can share the task of caring for a child with special needs, the challenge may draw them closer (Affleck et al., 1990). Intervention programs for low-birthweight children involving both parent training and child preschool classes have improved parenting and child outcomes (Klebanov et al., 2001).
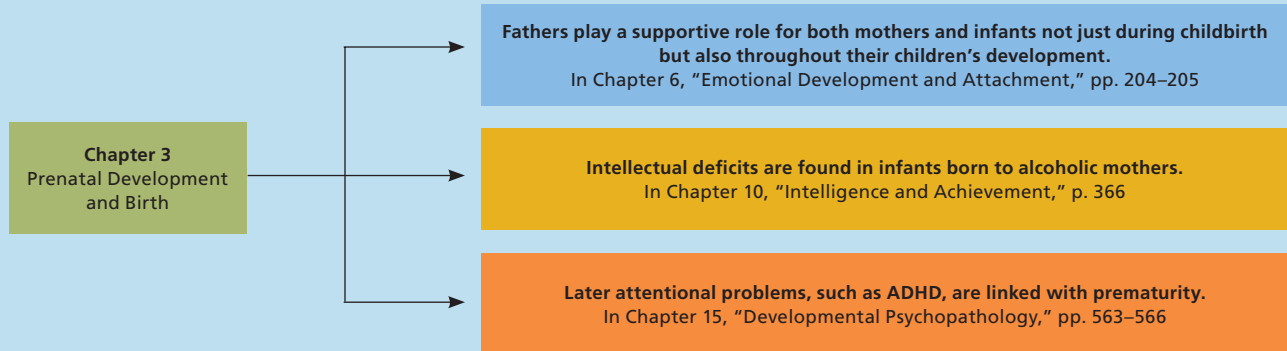
VULNERABILITY AND RESILIENCE IN CHILDREN AT RISK

In this chapter, we have discussed a number of events and conditions that can cause things to go wrong in pregnancy and childbirth. At this point, you may be wondering if things ever go right! Indeed, they do; most pregnancies proceed without major disruptions, and many couples find the period of waiting and preparing for the arrival of a

Making the Connections 3

There are many links between concepts and ideas presented in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 3 and discussions in other chapters of this book.

Chapter 3
Prenatal Development and Birth

→ **Fathers play a supportive role for both mothers and infants not just during childbirth but also throughout their children's development.**
In Chapter 6, "Emotional Development and Attachment," pp. 204–205

→ **Intellectual deficits are found in infants born to alcoholic mothers.**
In Chapter 10, "Intelligence and Achievement," p. 366

→ **Later attentional problems, such as ADHD, are linked with prematurity.**
In Chapter 15, "Developmental Psychopathology," pp. 563–566

child one of the happiest times of their lives. Among *all* children, only about 10% are born with any kind of disability or anomaly.

Things go wrong often enough, though, that researchers have attempted to determine how the effects of adverse prenatal and perinatal events are either compounded or compensated for by subsequent conditions. They have tried to uncover the reasons some children with early problems develop *resilience*, or the capacity to achieve competence in life despite initially challenging circumstances.

In trying to understand resilience, researchers have found that both features of the environment and biological characteristics of the child can play roles in determining how successfully a child develops. The kinds of prenatal and perinatal biological factors that can affect the child negatively range from relatively minor perceptual, attentional, intellectual, motor, and behavioral disabilities to gross abnormalities. The environmental situation the infant enters can range from a healthy intact family with good caregiving skills and adequate financial support to a family or parent struggling with highly adverse conditions, including poverty, drug abuse, divorce, and violence (Sameroff, 2007; Sameroff & Chandler, 1975). For most researchers, resilience—the ability to overcome difficulties—results from the interaction between risk and protective factors (i.e., those that help minimize the effects of adversity such as strong family and community support) in the child and the environment (Luthar, 2007; Rutter, 2007; Selman & Dray, 2006).

In a longitudinal study of the development of the entire population of 698 children born in 1955 on the Hawaiian island of Kauai, Werner and her colleagues (Werner, 1995; Werner et al., 1971; Werner & Smith, 2001) assessed the long-term consequences of birth complications and adverse early rearing conditions. An update is given in Box 3-3. The researchers discovered that the effects of adverse perinatal complications often lessen in intensity or disappear with age. This is in large part a function of the caregiving environment in which children mature. The Kauai study offered "a more hopeful perspective," according to Werner (1984), than did the previous literature on children with problems, and it has been followed by other similarly designed studies that tend to support its findings. More than one of these studies showed that a close and continuing relationship with another caring person is a significant factor in the development of resilience. Often, the caring person is not a parent but a grandparent, an older sibling, a neighbor, a day-care provider, a teacher, a minister, a youth worker, or an elder mentor who can help tilt the balance from negativity to resilience. These people accept

children's problems and allow them experiences that challenge but do not overwhelm their coping abilities. They guide the children in developing a sense of responsibility and caring and reward them for helpfulness and cooperation; they model for a child the conviction that life makes sense despite its adversities (Masten & Obradovic, 2007). Thus, even in what may look like the darkest situations, there may be opportunities for children to thrive.

SUMMARY

Stages of Prenatal Development

- Prenatal development is typically divided into three distinct periods (zygote, embryo, fetus). These periods represent continuous phases of development during which the organism, protected and sustained by the **amniotic sac**, the **placenta**, the **umbilical cord**, and after the fifth month, the lanugo, undergoes a systematic series of changes to become increasingly complex and differentiated.

- The period of the **zygote**, which lasts about 2 weeks, extends from fertilization to implantation, when the zygote becomes implanted in the wall of the uterus. The period of the **embryo** begins at that point and lasts until the end of the eighth week. During this period of rapid growth, most of the important organs and physiological systems develop, and the embryo is quite vulnerable to adverse environmental influences.

- The principles of **cephalocaudal** and **proximal-distal** development govern the order in which various parts of the organism's body are formed and grow. According to the first principle, physical growth begins in the area of the head and moves downward, toward the trunk and legs; according to the second, growth also proceeds from central areas, such as the internal organs, to more distant ones, such as the arms.

- The period of the **fetus** extends from the beginning of the third month until birth. Around the fourth and fifth months, the mother can feel the fetus move, and reflexes such as sucking appear. Nails appear, the skin grows more adultlike, and **lanugo** covers the body of the fetus. Although the major organ systems are well differentiated by this time, the central nervous system continues to develop at a rapid pace, reflexes develop, and regulatory processes and the respiratory system continue to mature. A danger at this time is **respiratory distress syndrome**, and if the child is born before the

age of viability, or 22 to 26 weeks, it may not be developed enough to survive.

Risks in the Prenatal Environment

- During prenatal development, **teratogens**, agents that produce developmental abnormalities, may affect the growing organism, resulting in physical and mental deviations. Several general principles summarize the effects of teratogens on prenatal development, indicating that the type, timing, and duration of the teratogen, as well as the genotypes of the mother and child, determine the outcome.

- Mothers who smoke cigarettes or drink alcohol are more likely to bear premature or low-birthweight babies than women who do not smoke or drink. Even too much coffee can be harmful to the fetus. In addition, maternal drinking is related to **fetal alcohol syndrome**, which results in facial abnormalities, short stature, and mental retardation. Even modest amounts of alcohol and passive smoking have been related to negative effects in the offspring. Moreover, genetic effects of fathers' smoking and drinking may be passed to their offspring.

- In the case of illegal drugs such as cocaine or heroin, drug-addicted infants may exhibit symptoms that disrupt parenting and result in long-term adverse outcomes for both child and parent. Drug-using mothers may have particular problems dealing with such infants because of their own troubles.

- Drugs taken by the mother during pregnancy, whether legal or illegal, may have a negative impact on the developing fetus. Sometimes, as in the case of **thalidomide** and **diethylstilbestrol**, the effects of a prescription drug on the infant are not known until birth or much later.

- Some obstetrical medications used to ease pain and sedate women during labor and delivery may affect the newborn's behavior for several days after birth.

However, there are often no longer term effects of such drugs.

- Mothers who have their first child when they are over 35 or under 15 are likely to experience more problems during pregnancy and difficulties during delivery than women between these ages. In both groups, the risks are related to maternal health. Young adolescents are less likely to eat properly or to get prenatal care; older women are more likely to have hypertension, diabetes, alcoholism, and other problems related to age.

- Deficiencies in maternal diet are related to increased rates of prematurity, stillbirth, infant mortality, physical and neural defects, and small size. The specific form a defect takes is related to the age at which the malnutrition occurs and its severity and duration. Dietary supplements provided during pregnancy and after birth have been successful at reducing some of these effects, but the extent of the reversibility of such damage is not known. Continued ill effects seem to be related to the mother's history of dietary deprivation, the length and severity of the malnutrition, and continuing adverse nutritional, social, and economic factors following birth.

- Eating undercooked meat or coming in contact with feces, as in handling cat litter, can lead to the parasitic disease **toxoplasmosis**, which is transmitted through the placenta and can cause eye and brain damage in the growing baby.

- Maternal emotional disturbance has been related to complications during pregnancy and delivery and to hyperactivity and irritability in infants after birth. Discovering the causes underlying these relationships is difficult because women who are emotionally upset during pregnancy may be poorly adjusted in a variety of ways that affect their caregiving and their infant's adjustment after birth.

- A wide range of maternal diseases and disorders can affect prenatal development, including **Rh factor incompatibility;** high blood pressure; diabetes; rubella; and sexually transmitted diseases such as **gonorrhea, syphilis, chlamydia, genital herpes**,

and **acquired immune deficiency syndrome**, or **AIDS**. The effects of maternal diseases are related to the stage of fetal development during which they are contracted and the length of time that they last.

Birth and the Beginnings of Life

- Birth involves a series of changes in the mother that permit the child to move from the womb to the outside world. These include uterine contractions during the first stage of labor that allow the cervix to become large enough for the child's head, the child's descent into the birth canal and emergence out of the canal during the second stage, and the expulsion of the placenta during the third stage. If problems arise before or during the delivery, a **cesarean delivery** may be performed by removing the baby through an incision in the mother's abdomen.

- Birth complications occur in only about 10% of deliveries. Some important birth factors related to developmental deviations and mortality are prematurity and low birthweight. **Preterm** birth and low birthweight have been associated with physical, neurological, cognitive, and emotional deficits. Most of these negative effects diminish with age, except in extreme cases. Stimulation programs have been successful with low-birthweight babies.

Vulnerability and Resilience in Children at Risk

- Both birth complications and the environmental situations into which a child is born may vary greatly along continua that stretch from the most favorable to the least favorable conditions for the child's well-being.

- Researchers who have studied the interaction of these continua have found that often more favorable early environmental conditions can compensate to some extent for adverse prenatal and perinatal complications.

EXPLORE AND DISCUSS

1. What advice would you give to a pregnant friend who drinks coffee and alcoholic beverages and smokes?

2. Do you think the government should prevent people from smoking or drinking during pregnancy? Explain your position.

3. Birth is a family affair, not just a mother's issue. How have the roles that fathers, other relatives, and even older siblings play in the birth process changed over the last several decades?

4. Medical science has permitted very small preterm infants to survive, but some of these children face physical, social, and cognitive problems. Discuss the ethical issues involved in the medical practice of keeping increasingly smaller preterm infants alive.

Boris Kustodiev (1878–1927). *The Morning Bath. (The Wife and Son of the Artist.)*

Russian State Museum, St. Petersburg, Russia.

4.

Infancy: Sensation, Perception, and Learning

Anabel's mother just purchased a new baby DVD series to show her 1-month infant; Carlos's dad plays classical music for his 3-day-old son while rocking him in his cradle; Michael's grandmother bought him a brightly colored mobile for his crib so on the day the newborn arrives home from the hospital he can see it. Each of these adults has different ideas about what a baby is able to do early in life. Researchers are very interested in this question, and much of their work focuses on the sensory and perceptual world of infants. They have discovered that babies can hear, see, and respond to various types of sights and sounds at a much earlier age than was once believed. Even in the first few minutes after birth, infants show remarkable capabilities.

    We begin this chapter with a look at the newborn's earliest behaviors, including the baby's normal reflexes; we also examine ways of assessing the newborn's health, maturity, and capacities. We then look at the growth and development of the infant's sensory and perceptual abilities—auditory, visual, taste, and touch. We conclude with a discussion of early learning processes, including what is known about the infant's memory abilities.

THE NEWBORN

Parents are sometimes quite surprised at the appearance of their newborns. At the moment of birth and for a little while afterward, most newborns, or **neonates**, are pretty homely little beings. Their noses, ears, and entire heads often bear the marks of the pressure exerted on them as they passed through the birth canal, and their skin is often red, wrinkled, and blotchy, partly as the result of floating for 9 months in amniotic fluid. Their heads are oversized in proportion to their bodies (in fact, from childhood to adulthood, the head goes from a quarter to an eighth of total body size), and their tiny legs appear weak, even useless. But despite these characteristics—most of which disappear before the newborn period of 3 to 4 weeks is over—most parents welcome their newborns with joy and love.

A New Baby's Reflexes

Newborns have many capabilities. They have well-developed reflexes and sensory responses, and they can respond and adapt to the environment from the first moments after birth. Moreover, these early behaviors are not random and disorganized; rather, human behavior appears organized from very early in life. Some of the first behaviors to appear are **reflexes**, or involuntary responses to external stimuli. Table 4-1 describes the newborn's major reflexes, some of which are permanent (e.g., eye blink). Other reflexes disappear during the first year, and in some cases, these are replaced by voluntary behaviors that the baby learns early in life (e.g., rooting and sucking reflexes). Many of these reflexes help ensure the newborn's survival. For example, the eye blink helps to shield the eyes from strong light, and the rooting and sucking reflexes help the newborn to locate and obtain food. The functions of other newborn reflexes are less obvious. Researchers speculate that some of them may have had survival benefits for the infants of our evolutionary ancestors.

Babies have lots of reflexes (many are described in Table 4-1) that serve as important indicators of physical well-being. The 6-week-old's Babinski reflex (a) tells the examiner that the child's lower spine is fully functional; the infant's palmar grasp (b) and rooting response (c) at 4 weeks of age both confirm the absence of depression.

Abnormalities in a baby's reflexes during the first days or weeks after birth can be useful in identifying visual and hearing problems, and they can even help predict abnormal functions that don't appear until months or years later (Dubowitz & Dubowitz, 1981; Francis et al., 1987). Reflexes that are either weak, absent, unusually strong, or that fail to disappear when expected can be a sign of neurological problems. At birth,

(a)

(b)

(c)

Table 4-1   The newborn's major reflexes

Reflex	Method	Baby's Response	Significance of Response	Developmental Course of Reflex
		Testing the Reflex		
Permanent				
Biceps reflex	Tap on the tendon of the biceps muscle	Baby displays short contraction of muscle	Absent in depressed babies or those with congenital muscular disease	Brisker in first few days
Eye blink	Flash bright light in baby's eyes	Baby blinks or closes eyes	Protects baby from strong stimuli	Relatively unchanging
Patellar tendon reflex ("knee jerk")	Tap on the tendon below the kneecap, or patella	Baby quickly extends or kicks leg	Weak or absent in depressed babies or those with muscular disease; exaggerated in hyperexcitable babies	More pronounced in first 2 days than later
Withdrawal reflex	Prick sole of baby's foot gently with a pin	Baby withdraws foot and pulls leg up, bending knee and hip	Absent when there is damage to the sciatic nerve, the largest nerve of the body	Constantly present during first 10 days; less intense later
Temporary				
Babinski reflex	Stroke bottom of foot from heel to toes	Baby's big toe curves up and other toes fan and curl	Absent in defects of the lower spine	Usually disappears near end of first year; replaced in normal adult by plantar flexion of big toe
Babkin or palmar reflex	With baby lying on his back, apply pressure to both of baby's palms	Baby opens mouth, closes eyes, and moves head to midline position	Inhibited in general depression of the central nervous system	Disappears at 3–4 months
Moro reflex	Suddenly allow baby's head to drop back a few inches; lower baby's overall position about 6 inches or make sudden, loud noise	Baby throws arms outward and extends legs; then brings both arms back toward center of body, clenching fists	Absent or consistently weak reflex indicates serious problem in central nervous system	Disappears at 6–7 months
Palmar grasp	Press a finger or cylindrical object against baby's palm	Baby grasps finger or object	Weak or absent in depressed babies	Initially strong; disappears by 3–4 months; replaced by voluntary grasp within a month or so
Plantar or toe grasp	Press on the ball of the baby's foot	Baby curls all toes, as if grasping	Absent in defects of the lower spinal cord	Disappears between 8 and 12 months
Rooting response	Stroke baby's cheek lightly	Baby turns head toward finger, opens its mouth, and tries to suck	Absent in depressed babies	Disappears at about 3–4 months and becomes voluntary
Stepping reflex	Support baby in upright position and move her forward, tilting her slightly to one side	Baby makes rhythmic stepping movements	Absent in depressed infants	Disappears at 3–4 months
Sucking response	Insert finger 1–1.5 inches into baby's mouth	Baby sucks finger rhythmically	Weak, slow, interrupted sucking found in apathetic babies; maternal medication during childbirth may depress sucking	Often less intensive and regular in first 3–4 days; disappears by 6 months

physicians often test the newborn for certain reflexes to evaluate the baby's central nervous system. As we saw in Chapter 3, infants exposed in utero to harmful substances can have neurological defects that can be assessed by observing the infants' reflexes (Phillips et al., 1996). For example, babies exposed to cocaine show abnormal patterns in the intensity of the sucking and rooting reflexes.

Infant States

infant state A recurring pattern of arousal in the newborn, ranging from alert, vigorous, wakeful activity to quiet, regular sleep.

Just like adults, babies have alternating patterns of sleep and wakefulness. These patterns are referred to as the **infant state**, which is defined as the recurring pattern of arousal that ranges from alert, vigorous, wakeful activity to quiet, regular sleep.

Infant states tell us some important characteristics of human behavior (Table 4-2). First, they indicate that from early in life, human behavior is *organized* and *predictable*. Infant states do not occur in a random, haphazard manner. Rather, they recur in a regular fashion. Second, human beings are not passive creatures that merely react to the environment. Internal forces regulate much of our behavior and explain many of the changes in our activity levels (Schaffer, 1996). This is not to say that a baby's states can't be affected by outside forces; our later discussion of soothing techniques shows that they can be. Our point here is simply that internal forces play a central role in infant states and their changes.

Studies of fetal activity and premature infants tell us that arousal patterns begin to form before birth (Sontag, 1944). In one study, babies born 2 months prematurely exhibited regular changes in state that developed and became more organized as the infants grew older (Holditch-Davis, 1990). Also, as we discussed in Chapter 2, individual differences in state of arousal and the ability to regulate states are important components of temperament.

There are two basic infant states: waking and sleeping. Each of these states includes several variations. When infants are in the waking state, they may be quiet, active, or distressed, as in fussing and crying. The state of sleeping also includes variations. Here we focus on sleeping and one variation of the waking state: crying behavior.

SLEEP   The newborn, on average, sleeps about 70% of the time in a series of long and short naps during the day and night. By the time an infant is 4 weeks old, her

Table 4-2   Newborn infant states

State	Typical Duration	Characteristics
Regular sleep	8–9 hours	Infant's eyes are closed, and body is completely still. Respiration is slow and regular. Baby's face is relaxed, with no grimacing, and eyelids are still.
Irregular sleep	8–9 hours	Baby's eyes are closed, but baby engages in gentle limb movements and general stirring. Grimaces and other facial expressions are frequent.
Drowsiness	$\frac{1}{2}$–3 hours	Baby's eyes open and close intermittently and display recurrent rapid eye movements. Baby is relatively inactive. Respiration is regular, though faster than in regular sleep.
Alert inactivity	2–3 hours	Infant's eyes are open, have a bright and shining quality, and can pursue moving objects. Baby is relatively inactive; face is relaxed and does not grimace.
Waking activity	2–3 hours	Baby's eyes are open but not alert, and respiration is irregular. Baby frequently engages in diffuse motor activity involving the whole body.
Crying	1–3 hours	Baby makes crying vocalizations and engages in diffuse motor activity.

Sources: Wolff, 1966, 1987.

Percent of total recording time
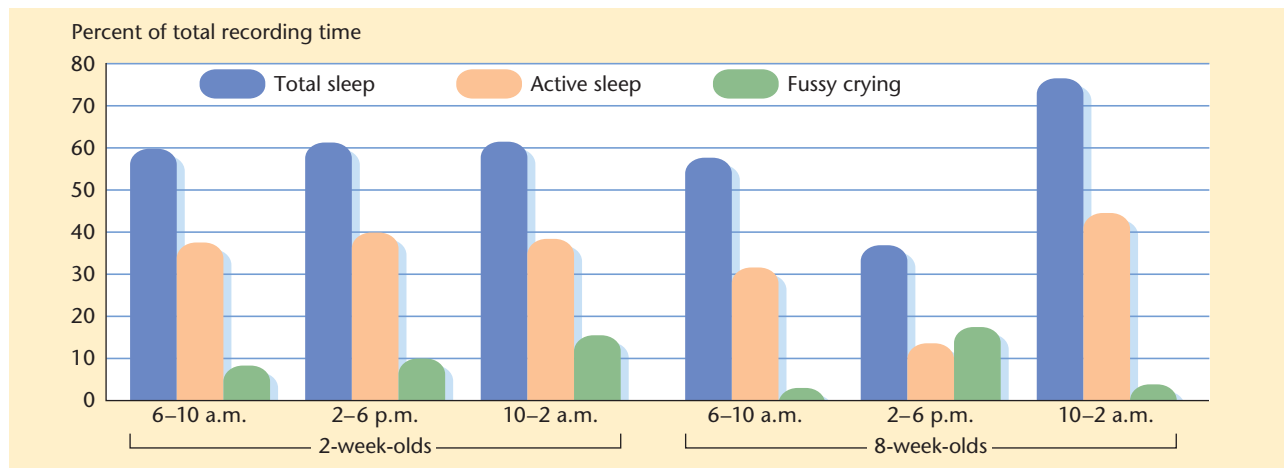
Figure 4-1

Infants' sleep patterns

At 2 weeks of age, infants tend to maintain about the same ratio of total sleep, active sleep, and fussy crying in the morning, afternoon, and at night, but by the time they're 8 weeks old, they have begun to spend appreciably more time in quiet sleep during the nighttime hours.

Source: Sostek & Anders, 1981.

periods of sleep tend to be fewer but longer, and by the time she is 8 weeks old, she is sleeping more during the night and less during the day (Ingersoll & Thoman, 1999). As Figure 4-1 shows, the infant also becomes less fussy as she gains better control over her states of arousal. By the end of the first year, most infants sleep through the night, much to the relief of their parents. This shift illustrates how the infant's internal biorhythms become adapted to the demands of the external world (Ikonomov et al., 1998).

Not all cultures organize sleep patterns in the same way that U.S. parents do (Harkness & Super, 1995). Among the Kipsigis of rural Kenya, infants are constantly with their mothers and regularly take naps throughout the day. In contrast to American babies, who gradually begin to sleep longer at night and less during the day, Kipsigis babies continue to take shorter and more frequent naps. Although these Kenyan babies eventually sleep through the night, they show this pattern much later than American babies (Super & Harkness, 1981).

Sleeping arrangements differ across cultures as well. In contrast to the U.S. custom of putting babies to sleep alone in their own rooms, many cultures encourage cosleeping arrangements, with parent(s) and infant in the same bed (Rogoff, 2003). Kipsigis babies sleep with their mothers, but when a new child is born, the older sibling sleeps at the mother's back, indicating that breast-feeding and constant carrying are over for the older infant (Harkness & Super, 1995). Some mothers, like Mayan mothers in Guatemala, disapprove of the U.S. custom of separate beds for babies; indeed, they regard it as "tantamount to child neglect" (Morelli et al., 1992, p. 608). There are some exceptions in the United States, however. For instance, among Appalachian families, nearly 50% of children aged 2 to 4 cosleep with parents (Abbott, 1992). And recently, middle-class U.S. families have shown more interest in closer arrangements with infants, as evidenced by sales of bedside cribs for parents who want to have their infants nearby at night. Clearly, parents do not take lightly the matter of parent-child sleeping arrangements. In fact, the sleeping arrangements of parents and children "represent central ideas about family relationships and the proper course of human development" (Harkness & Super, 1995, p. 228). See Box 4-1 for a discussion of the serious risk of sudden infant death syndrome (SIDS) and sleep.

BOX 4-1
Child Psychology in Action

PREVENTING SUDDEN INFANT DEATH SYNDROME (SIDS)

Each year in the United States, about 10,000 babies die in their sleep from causes classified as **sudden infant death syndrome (SIDS)**, also known as *crib death*. It is most common between the ages of 2 and 4 months and rarely occurs after 6 months (*American Academy of Pediatrics Report*, 2000).

Its most likely victims are low-birthweight male babies with a history of respiratory problems, who were hospitalized longer than usual after birth and who have abnormal heart-rate patterns and night-time sleep disturbances (Mitchell et al., 1993; Rovee-Collier & Lipsitt, 1982; Sadeh, 1996). Their mothers are more likely to be anemic, use narcotics, and to have received little prenatal care. Parental smoking has also been suggested as a contributing factor (Frick, 1999). It is important to stress, however, that most babies of women with these characteristics are not affected.

The cause of SIDS is still a mystery (Hunt, 2001). It is not due to accidental suffocation, to mucus or fluid in the lungs, or to choking on regurgitated food. Nor has there been any success in finding a virus associated with SIDS, although this is still a possibility. Another possibility is that *apnea*, the spontaneous interruption of breathing that sometimes occurs during sleep, may be a factor (Steinschneider, 1975). The brainstem, which controls breathing, may not be developed well enough in some infants to overcome brief cessations in breathing.

One hypothesis about the cause of SIDS is that its victims may have failed to develop adequate responses to nasal blockage and other threats to breathing (Lipsitt, 2003). Although newborns have reflexes that provide them with built-in defensive reactions to respiratory threats (e.g., when a cloth is placed over a baby's face, she will use her hands to try to remove it), between 2 and 4 months of age, these reactions change from reflexive behaviors to voluntary ones. Crib death is most common during this same age period. Perhaps failure of some infants to make a smooth transition from reflexive to voluntary defenses puts an infant at greater risk for SIDS.

Monitors that sound an alarm to alert parents when an infant's breathing is interrupted may be useful in preventing SIDS. Although the false alarms of these devices may place stress on the parents, the devices may help to save lives. Babies should not sleep on very soft mattresses or be surrounded by pillows that may obstruct breathing (*American Academy of Pediatrics Report*, 2000). It is also helpful for babies to sleep on their backs, not on their stomachs; sleeping on the stomach may depress breathing (Willinger et al., 1994). In the 8 years following the recommendation from the American Academy of Pediatrics that babies sleep on their backs (the Back-to-Sleep Movement), there was a 50% decline in infant deaths attributable to SIDS. The success of this movement is encouraging, and scientists continue to search for the cause of this terrible disorder.

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sudden infant death syndrome (SIDS) The sudden, unexplained death of an infant while sleeping; also called *crib death.*

REM sleep REM, or rapid eye movement, sleep is characterized by rapid, jerky movements of the eyes and, in adults, is often associated with dreaming.

Researchers have used brain-recording techniques when infants sleep, and they have distinguished different phases of the infant sleep cycle. One distinction that has been identified is between **REM sleep** and *non-REM sleep*. REM, or rapid eye movement sleep, is often associated with dreaming because in adults it is during dreaming that the eyes, under closed eyelids, have been observed to dart around in rapid, jerky movements. Although infants also have REM sleep, there is presently no way of knowing if infants dream.

In addition to rapid eye movement, REM sleep is characterized by fluctuating heart rate and blood pressure. The full purpose of REM sleep is unknown, but we do know that it has functional value: If people are awakened repeatedly as they begin REM sleep and thus are prevented from obtaining this type of sleep, they tend to be irritable and disorganized during their later waking hours.

Compared to adults and older children, newborns have a lot of REM sleep. In newborns, 50% of sleep is REM sleep. As children age, REM sleep declines to about 20% (Ingersoll & Thoman, 1999). By the age of 18 and onward through adulthood, most people sleep about 8 hours a day, and of that amount, only about an hour and a half is REM sleep.

An explanation, referred to as **autostimulation theory**, has been proposed to account for the high level of REM sleep in newborns. Researchers have suggested that this type of sleep is self-stimulating; that is, it stimulates the infant's brain and thereby helps in the development of the central nervous system (Roffwarg et al., 1966). As the infant develops and becomes more alert and capable of processing external stimulation, this type of built-in stimulation may become less necessary. If this theory is right, the speed with which infants reduce their percentage of REM sleep could depend on how much external stimulation they receive. In one study, infants who were encouraged to stay awake and who were exposed to visual stimuli spent less time in REM sleep than infants in a control condition who were not provided with these opportunities (Boismier, 1977).

autostimulation theory
The theory that during REM sleep the infant's brain stimulates itself and that this, in turn, stimulates early development of the central nervous system.

CRYING   Crying is one of the infant's earliest means of communicating needs to caregivers. Three different patterns of crying, reflective of the infant's varying needs, have been identified (Schaffer, 1971, p. 61).

Pattern	Characteristics
Basic	Starts arrhythmically and at low intensity; gradually becomes louder and more rhythmic; sequence is cry-rest-inhale-rest. Linked to hunger, among other factors.
Angry	Same as basic pattern except that segments of crying, resting, and inhaling vary in length, and crying segments are longer. Causes include removing a pacifier or toy.
Pain	Sudden in onset, loud from the start, and made up of a long cry followed by a long silence that includes holding the breath and then by a series of short, gasping inhalations. Causes include discomfort from soiled diaper or a stomachache.

Most mothers can distinguish among these different types of crying but only when listening to the cries of their own babies (Wiesenfeld et al., 1981). In general, fathers are less skilled than mothers at distinguishing among types of cries, and nonparents are less skilled than parents (Holden, 1988). These differences are probably related to varying amounts of experience with babies and differences in the amount of time spent caring for them.

In the early months of life, crying is usually related to the infant's physiology; hunger, hiccups, or digestive problems may disturb him and lead to crying. By 3 or 4 months, however, crying is less associated with physiological distress and increasingly related to the baby's psychological needs, such as wanting to be picked up or played with. Also, by this age, most infants spend less of their days crying, and their concerns are easier to interpret (Kopp, 1994).

Crying often leads to a response from the caregiver. In one study, 77% of 2,461 episodes of crying that were observed were followed by some intervention by the mother (Moss, 1967). This intervention becomes an opportunity for social interaction, so the caregiver is rewarded in two ways: The crying stops, and the caregiver and child engage in a mutually enjoyable exchange (Lester, 1988).

Newborns typically cry because of some form of physiological distress, such as hunger, the need for a diaper change, or digestive problems. By 3 or 4 months of age, a baby's crying—a clear form of communication—will often be related to psychological needs, such as his wish to be picked up and hugged or caressed or to be played with.

For years, people have debated the wisdom of *always* responding promptly to a baby's cries. In the earlier part of the twentieth century, many people believed that rushing to soothe a crying infant would "spoil" the baby and encourage the infant to cry too easily. Then, in the 1970s, research suggested that the opposite might be true: When mothers respond promptly to their crying infants, the frequency and duration of crying may actually *decrease*, as the baby develops the expectation that the mother can be counted on to help (Bell & Ainsworth, 1972).

To test this latter hypothesis, Hubbard and van IJzendoorn (1991) observed infants in their homes over the first 9 months of life. Crying

declined greatly after the first 3 months, perhaps because the babies were adjusting to life in their new environments or because of changes in neurological organization (Nelson, 1999a). Individual differences in the duration of crying could not be explained by differences in how promptly mothers responded to their babies. However, the researchers did find that delays in the mother's responding seemed to cause a decrease in the number of crying bouts. This result makes sense if we differentiate two situations in which parents respond to infant crying. In some instances, parents respond to severe infant distress. In other cases, parents respond to mild fussing by the infant over a minor matter (e.g., an uncomfortable body position). Parents are generally able to distinguish between these levels of distress without difficulty. Delaying a response to this second kind of crying may help to make the baby more self-sufficient in dealing with minor irritations, and so the child fusses less often and, with time, has fewer crying bouts overall. The parent, however, must be a good judge of the causes of the baby's cries, for ignoring the cries of a severely distressed infant could have serious consequences.

colic A prolonged period of unexplained crying by an infant.

Sensitivity to differences in cries and their meanings is useful for physicians who treat very young children. Crying patterns can help alert pediatricians to possible abnormalities in early development (Worchel & Allen, 1997). For instance, infants with brain damage take longer to cry in response to a painful stimulus, require a more intense stimulus to cry, and produce a less sustained, more arrhythmic, and higher pitched cry than normal infants (Lester et al., 1988). Sometimes, in a condition called **colic**, babies cry a great deal for no apparent reason. Colic (the word means "pain") is a prolonged period of unexplained crying by infants that sometimes lasts several hours at a time. Infantile colic, which occurs in about 20% of infants, usually begins between 2 and 4 weeks of age, and its causes are not known (Lester, 2005). This loud, continual crying can be frustrating, even frightening, for parents. In most cases, it stops by the time the baby is 3 to 4 months of age. Although colic is usually harmless, in some cases it may indicate an illness, such as a hernia or an ear infection. A high-pitched, urgent, and "piercing" cry can help to differentiate babies with colic from those who simply cry a great deal or are ill (Lester et al., 1992). The infant cry is not only an important communicative signal but also an early warning sign of developmental problems and illness.

How to Soothe an Infant

As infants grow and mature, they are less likely to cry as a way of communicating their distress. Because not all forms of distress go away, ways of dealing with distress appear to be an increasingly important part of the baby's life. To understand how infants relieve their distress, researchers have studied what infants do to soothe themselves.

INFANTS' ABILITIES TO SOOTHE THEMSELVES   Even very young infants have some techniques available to relieve their own distress. One way is by sucking, which the baby routinely engages in, even while still in utero. After birth, sucking on things, including the baby's own thumb and hand, may comfort very young infants. Although it was long assumed that sucking was effective because of its association with feeding, researchers have found that, immediately after birth and before the baby's first oral feeding, simply sucking on a pacifier reduces a baby's distress (Smith et al., 1990). It may be that sucking has a soothing effect because when the baby sucks, its overall body movements are lessened. Research indicates that sucking on certain substances calms infants more effectively than sucking on other substances. For example, sucking on substances with a sweet taste is more effective in calming young infants than sucking plain water (Smith & Blass, 1996). The soothing techniques that work change as the infant develops. Sucking on a sweet liquid is effective in calming a 2-week-old baby, but it is less ineffective in soothing a 4-week-old unless accompanied by eye contact with an adult (Zeifman et al., 1996). It seems that as early as 4 weeks, the infant begins to rely on social contact with caregivers to soothe him and help regulate his states.
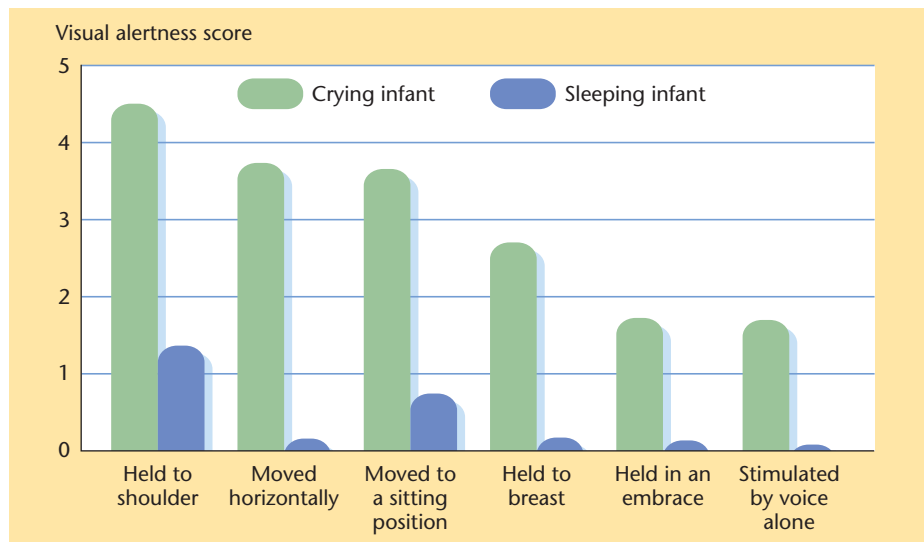
Figure 4-2

The effects of stimulation on an infant's visual alertness

In a classic study of how to bring an infant into a calm but alert state, holding the baby to one's shoulder was the most effective method.

Source: Korner & Thoman, 1970.

HOW PARENTS SOOTHE THEIR BABIES   Infants pay more attention to events in their environment, and therefore can learn more, when they are in a calm but alert state. This suggests that soothing babies to help them reach a state in which they are neither too drowsy nor upset is one of the critical tasks of parenting. Because sucking can soothe infants, parents may use a pacifier with very young infants. This technique can comfort infants rapidly and effectively (Campos, 1989). A variety of other techniques (see Figure 4-2) are also effective in soothing a crying infant, including rocking, swaddling, and massaging (Field, 2001a; Rock et al., 1999). In swaddling, a baby is wrapped tightly in a blanket or cloth, thus keeping the baby's arms and legs immobile. Swaddling is used successfully in hospital nurseries throughout the United States and in many cultures around the world to soothe infants (Valsiner, 1989).

There are differences across cultures in the ease with which babies in distress can be soothed (Kagan & Fox, 2006). For example, studying infants in the United States, Freedman (1974) found that European American babies shifted more frequently between states of contentment and distress than Chinese American babies did. Additionally, Chinese American babies tended to calm themselves more readily when they were upset and were also more easily consoled by their caregivers. Soothability varies among babies in other cultural groups both within the United States and beyond its borders. Japanese babies, for example, and babies of the Zinacanteco community of southern Mexico are more easily quieted than other infants (Nugent et al., 1989).

Navajo babies in the American Southwest who, for about the first year of their lives, spend much of the day on a cradleboard are also easier to soothe than many other babies (Chisholm, 1963). The cradleboard, which is used by the Navajo and other Native North American tribes as well as in other parts of the world, is made up of a wooden back, a hinged footboard, and a hoop that arches over and shields the baby's head and face. These components are held together by leather straps, the board is cushioned with bedding material and a blanket, and a laced cover holds the baby and the bedding snugly in place. Newborns and sleeping infants are swaddled from the neck down, but after about 3 months, babies' arms may be left free (Chisholm, 1963).

Although the cradleboard limits a baby's motor actions, it provides an advantage that the bassinet, the crib, and the traditional carriage do not. Because the cradleboard has a rigid back, it can be propped up against a wall or tree; the board is notched at the top so that it can be securely wedged in this upright position. (Of course, when the child is sleeping, the cradleboard is laid flat.) Toys, beads, feathers, and other objects that interest the baby are often hung from the hoop, and when his arms are free, the baby can reach and bat at these playthings. Also, when the cradleboard is in this position, the

Tight swaddling provides a Havasupai infant with a feeling of comfort and security. Like many choices in child-rearing, using the Native American cradleboard has clear tradeoffs. Although the cradleboard restricts a baby's movements (until the infant's arms are freed, at about 3 months), it also allows the baby to see and experience many things that an infant in a crib may miss because the mother carries the cradleboard with her and can set it up against a firm backing.

Brazelton Neonatal Assessment Scale A scale containing a battery of tests used to measure an infant's sensory and perceptual capabilities, motor development, range of states, and ability to regulate these states, as well as whether the brain and central nervous system are properly regulating involuntary responses.

baby can more easily see what is going on around him than is the case with babies in cribs and other such arrangements (Chisholm, 1963).

Experts disagree on whether the Navajo infant's greater soothability is due to the motor restrictions experienced on the cradleboard over the first year. Perhaps Navajo newborns are calmer at birth than are babies from some other cultures, and this is the reason that Navajo babies are comfortable on the cradleboard (Chisholm, 1963). However, some researchers suggest that swaddling has a calming influence on most newborns (see, e.g., Tronick et al., 1994).

Evaluating the Newborn's Health and Capabilities

To find out about the health, maturity, and capabilities of the newborn, tests of the baby's reflexes (see Table 4-1) may be combined with other assessment techniques. One of the most widely used tests for newborns is the **Brazelton Neonatal Assessment Scale** (Brazelton et al., 1987). As you can see from Table 4-3, this test measures many of the capabilities of the infant we discuss in this chapter: sensory and perceptual abilities (including orientation to sights and sounds); early learning capabilities (e.g., familiarity or habituation to sensory stimuli); motor development (e.g., muscle tone); infant states and the ability to regulate them (including soothability); and signs that the brain is properly controlling involuntary responses (e.g., the startle reflex).

The Brazelton scale has been used for a variety of purposes. It is used to identify infants at risk for developmental problems, and it can aid in diagnosing neurological impairment (Black et al., 1993; Eldredge & Salamy, 1988). The scale is also useful in predicting later development. For instance, newborns who score high on it tend to score higher on later measures of cognitive, motor, or social development (Keefer et al., 1991). Finally, the Brazelton scale has been used as an intervention technique, teaching parents about their newborn's capacities either by having them watch a health-care professional administer this test to their baby or by having them try the same tests with their baby themselves (Wendland-Carro et al., 1999).

Cross-cultural research on infant motor development has shown that a baby's behavior during the Brazelton assessment may predict later parent-infant interaction. Using the Brazelton scale, researchers identified superior motor performance by infants in the Gusii community of West Africa in comparison with American babies (Nugent et al., 1991). This superior ability was found to be related to more vigorous handling by caregivers early in the child's life, including carrying the child on the mother's body in a sling, which has the effect of strengthening various muscles in the infant's body as she grips the mother (Keefer et al., 1991). The infants' motor abilities influence the way caregivers treat them, which in turn is influenced by cultural practices and behavioral routines. Together, these forces give infants opportunities to improve their motor control.

THE INFANT'S SENSORY AND PERCEPTUAL CAPACITIES

Infants have limited knowledge of the world. They learn much about the world very quickly, and much of this learning occurs by using their sensory and perceptual capa-

bilities. The infant's sensory receptors, such as their eyes and ears, teach them about the world through their **sensations**—the stimuli their sensory receptors detect—and their **perceptions**—their interpretations of the stimuli they detect. Researchers have discovered that babies' sensory and perceptual capabilities are quite well developed, even at birth, allowing infants to begin adapting immediately to the environment.

As this chapter's Turning Points chart (pp. 116–117) shows, the infant's sensory and perceptual abilities are especially sensitive to the social environment, including human voices, faces, and smells. This suggests that a baby's sensory and perceptual systems may be biologically prepared to process and respond to social stimuli. Such preparation is clearly adaptive: A baby's responsiveness to other human beings increases caregivers' interest in the child and thereby enhances the child's well-being and survival. The infant's inborn sensitivity to social stimuli is one of the issues we examine more closely in this section of the chapter.

A second issue we explore is the connection or interdependence among the various sensory and perceptual systems: vision, hearing, taste, smell, and touch. To present the different systems in an orderly way, we discuss each one separately. However, it is important to remember that these systems develop together, and advances in one may trigger changes in another; for example, improvements in vision that come with age may help the infant identify the location of a new sound. Later in this section, we will discuss how these systems influence each other and how, by working together, they help the infant understand the world. Our discussion of the interplay of developing systems continues in Chapter 5, where we examine how changes in an infant's motor capabilities, such as the emergence of crawling or walking, can have a profound effect on how a child perceives the world.

Unlocking the Secrets of Babies' Sensory Capabilities

Studying infants' sensations and perceptions is not easy. Without language skills, babies can't respond to direct questions as to whether one tone is louder than another or whether two colors appear different. Very young babies even have trouble reaching or pointing toward something that interests them, and crawling in the direction of an interesting stimulus is far beyond their skills. Thus, many of the research methods we use to study sensation and perception in older children and adults are not available for studying infants. What's more, even if we determine that infants possess a certain sensory capability (e.g., distinguishing between the tastes of sweet and sour), we cannot be sure they experience the same sensations as older children and adults. Sensations may mature or change with age.

In their efforts to solve these research problems, psychologists have used techniques that measure whatever responses young babies are able to make. In particular, to study an infant's sensory capabilities, researchers have relied on information from the autonomic nervous system, which controls involuntary bodily functions such as heart rate and respiration or breathing. For example, a change in a baby's breathing following a change in the pitch of a sound suggests that the infant heard the pitch change. A newborn's motor responses, although limited, can also give clues to sensory abilities. For instance, a slight turn of the head or kicking of the legs may be used to assess an early ability. Researchers have also used the infant's well-developed sucking pattern to measure sensory abilities. Infants' sucking patterns can change in intensity or duration in response to input from the environment. For instance, one technique used to study infants, called the *violation-of-expectation* method, introduces an unusual or impossible sight, such as an object floating in space or suspended without adequate support (Baillargeon, 1994). If on seeing this information the baby responds by altering his behavior (e.g. by slowing down or stopping his rate of sucking), it suggests that the baby knows something about how objects normally work and that his expectation of this

sensation The detection of stimuli by the sensory receptors.

perception The interpretation of sensations to make them meaningful.

Turning Points

visual preference method
A method of studying infants' abilities to distinguish one stimulus from another in which researchers measure and compare the amounts of time babies spend attending to different stimuli.

normal course of events has been violated. By noting changes in the types of behaviors babies are able to produce on their own at the moment that stimuli are presented to an infant, researchers can determine whether the baby detected a difference between two or more stimuli or whether he expected certain patterns to occur.

Another commonly used technique of examining infants' abilities is the **visual preference method**, which the psychologist Robert Fantz (1963) pioneered. In this technique, the researcher presents an infant with two stimuli and measures the amount of time she spends looking at each. If the infant looks longer at one stimulus than at the other, we can assume that she can distinguish the two stimuli from each other. Looking longer at one stimulus may also indicate that the infant finds one stimulus either new or unfamiliar, more interesting, more complex, or more pleasurable than the other one. Such interpretations are speculative, however. We cannot know for sure why the infant looks longer at one stimulus than another.

9 MONTHS	• More visually aware of tiny objects; if given choice of picking up either large or small object, will choose the smaller item. Begins to remember without cues. Uses knowledge to solve problems; aware of cause and effect; recognizes that his own actions may affect outcomes. "Uses" other people to make things happen.
10 MONTHS	• Begins to visually group similar objects. Discriminates an object within another, e.g., a cookie inside a jar. Investigates textures, designs, or parts of toys; repeats play sequences with different toys. Peers intently at pictures.
11 MONTHS	• Uses props as aids, e.g., uses chair to pull to standing position.
12 MONTHS	• Groups toys with like features, such as color or size. Checks own feet when walking. No longer discriminates speech sounds that are not in parents' language(s). Uses imitative learning. Deliberately introduces variations into play sequences. Memory is improved.
15 MONTHS	• Makes groupings of objects that go together. Trial and error learning. More aware of functions of objects. Recognizes and uses more cause-and-effect relationships.
18 MONTHS	• Differentiates round puzzle pieces from square ones. Recall memory improved. Has primitive idea of what "should be": puts lids on jars; pays attention better; recognizes that others have possessions.
21 MONTHS	• Differentiates round, square, and triangular puzzle pieces and puts them in puzzle with help. Has some understanding of past, present, and future, some idea of categories.
24 MONTHS	• Tries to copy lines on paper. Elaborate play sequences show recognition of family members' specific roles. Begins to use strategylike, or planned, behaviors.

In many of the methods used to study early sensory and perceptual capacities, the assessment of the baby's abilities depends on infants' tendency to **habituate** to a stimulus when it is presented repeatedly. When they have repeated experience with a stimulus, infants gradually lessen the intensity of their initial reaction until, eventually, they respond only faintly or not at all. This pattern of behavior is used to assess learning in the Brazelton Neonatal Assessment Scale (see Table 4-3). To illustrate, imagine that you shake a rattle near a baby's head. The first time you shake the rattle, the child might display a *startle* response, thrashing his arms and legs and moving his body. However, if you repeated the noise a second time, this behavior would diminish: The infant might give only a brief kick. And after a few more times, the infant would appear to ignore the sound completely and show no response at all. Now if you presented a different sound, such as a bell, the baby would once again show a reaction, until she habituated to the sound of the bell. Notice that this reaction to the new sound tells you that the baby has distinguished the sounds of the rattle and the bell. Habituation can also be used to study the baby's ability to distinguish stimuli presented to the other senses—sights, smells, tastes, and tactile sensations. Therefore, habituation is widely used to explore infants' sensory and perceptual capabilities. You will see that this research technique was used to obtain much of the information that we discuss in the next few sections on the infant's senses of hearing, vision, smell, taste, and touch.

habituation A process of learning by which an individual reacts with less and less intensity to a repeatedly presented stimulus, eventually responding only faintly or not at all.

Table 4-3   Brazelton Neonatal Behavioral Assessment Scale

Capacity for Habituation

Habituation, a form of learning in which repeated exposure to a particular stimulus leads to reduced response to that stimulus. The infant's ability to habituate is a measure of her capacity for attention to new things in her environment:

1. Light
2. Rattle
3. Bell
4. Pinprick

Orientation to Sights and Sounds

The baby's ability to focus on and track various stimuli is measured as an indication of his capacity to see, hear, and orient to things in his physical and social environment:

5. Visual focusing and following an inanimate object
6. Reacting to an inanimate auditory stimulus
7. Visual focusing and following a human face
8. Reacting to the sound of a human voice
9. Reacting to both the sight of a human face and the sound of the person's voice

Motor Development

These tests measure the infant's motor skills:

10. Baby's ability to pull to a sitting position
11. Defensive ability: Baby's ability to free himself of light cloth placed over eyes
12. Degree of alertness
13. General tonus
14. Motor maturity
15. Activity

State: Range in Degree of Arousal

Tests measure and record the variability and intensity of the infant's periods of arousal:

16. Peak excitement
17. Rapidity with which excitement builds
18. Irritability: Number of times the baby fusses and things appear to irritate her
19. Lability, or variability, of state: Frequency and intensity of changes in state

State: Regulation and Self-Regulation

These tests measure the infant's responsiveness to efforts to quiet or soothe her as well as her ability to quiet herself:

20. Cuddliness: A measure of the baby's willingness to be held and to conform to the examiner's body
21. Consolability with intervention: A measure of how long it takes an examiner to quiet a baby who is upset
22. Self-quieting: The baby's own efforts to soothe himself, as by thumb sucking
23. Whole hand to mouth

Autonomic Stability

Tests measure the infant's autonomic (uncontrolled) reactivity to various stimuli:

24. Tremors: Severe tremulousness may indicate problems in the central nervous system
25. Startles: The baby's tendency to react to sudden movement, loud sounds, and other strong stimuli with a startle response
26. Skin: Reactivity is assessed by measuring electrical activity on the surface of the skin

Source: Adapted from Brazelton et al., 1987.

Hearing: Babies Are Good Listeners

An infant's hearing can be tested shortly after birth, and these tests show that the newborn's hearing is extremely well developed (Saffran et al., 2006). This is not surprising when you recall that the development of the auditory system is completed in utero well before birth (see Turning Points chart in Chapter 3). In one study, researchers monitored changes in fetal body movements and heart rates and showed that even before birth, fetuses may hear complex sounds, like speech, presented outside the mother's body (Kisilevsky & Muir, 1991). Such sounds are carried through the amniotic fluid to the fetus as a series of vibrations. Even more interesting is the evidence that infants may learn and remember what is read to them before they were born. As you learn in Box 4-2, fetuses can apparently learn to distinguish not only their mother's voices but also the sounds and rhythms of the material their mothers are reading.

It's important to remember, however, that a newborn's hearing is not as well developed as an adult's. For a newborn, a sound must be louder—about 10 to 17 decibels louder—than the sound an adult can detect (Hecox & Deegan, 1985). (A *decibel* is a measure of sound pressure level, which we perceive as loudness.) Normal conversational speech is generally measured at about 60 decibels, a whisper at around 20 decibels, and the sound of a train at approximately 100 decibels. In addition, compared with adults, babies are less sensitive to low-pitched sound and are more likely to hear a sound that is high in pitch (Saffran et al., 2006). This may help explain why adults so often raise the pitch of their voices during *infant-directed speech*, also called *motherese* (Hoff, 2005). In speaking to babies, mothers and other adults and even older children (Shatz & Gelman, 1973) somehow know or quickly detect that a high-pitched voice is more likely to capture the child's attention. Over their first 2 years, however, babies rapidly improve in their ability to discriminate sounds of different pitch, until eventually they reach adult levels of discrimination (Saffran & Griepentrog, 2001).

Babies are remarkably sensitive to other qualities of sound; for example, they show a preference for music as opposed to nonmelodic sounds and even for one type of music over another. Even newborns will alter their sucking patterns if doing so allows them to hear music instead of general noise (Butterfield & Siperstein, 1972). By the time they are 2 months old, infants can distinguish among some types of musical sounds, such as those produced by bowing or by plucking the strings of a violin (Jusczyk et al., 1977). By the age of 6 months, infants can even distinguish changes in melodies (Trehub & Trainor, 1993). And infants who are 4 to 6 months old seem to prefer music composed of common chords to music composed of tone combinations not found in common chords (Schellenberg & Trehub, 1996). These early abilities have led some to speculate that human beings are biologically prepared for processing music (Winner, 2006). And some have even suggested that listening to music early in life has particular developmental benefits. For example, the idea known as the Mozart Effect suggests that listening to classical music can stimulate brain development and increase intelligence (D. Campbell, 2000). As intriguing as this idea sounds, research does not support the claim that listening to classical music or any kind of music increases intelligence (Hirsch-Pasek & Golinkoff, 2003).

Infants' attention to music, however, has been useful for learning about auditory abilities. Researchers have found that 6-month-old infants are able to distinguish melodies whether they are based on Western musical scales or on Javanese (*plog*) scales, whereas adults perform better with the Western scales (Lynch et al., 1990). It appears that, early in development, infants are able to process either type of scale, but with experience in their culture, they become more skilled at processing one type of scale over another (Aslin et al., 1998). As we will see in Chapter 7, research has revealed a similar shift in the infant's response to speech sounds. Although infants initially respond to the speech sounds of many languages, by the end of the first year infants respond only to the sounds of the language the people around them speak.

BOX 4-2
Child Psychology in Action

CAN INFANTS LEARN EVEN BEFORE THEY'RE BORN?

Speculating as to why newborn human babies perceive sound so well, Anthony DeCasper asked himself if perhaps they had already learned to listen in the womb. How could he test such a proposition? With a colleague, DeCasper designed a clever procedure in which babies could suck to control what they heard on a tape recorder: either their mother or a strange woman speaking to them (DeCasper & Fifer, 1980). As you will learn elsewhere in this chapter, newborns can learn to vary their sucking patterns. In this study, when infants sucked in a pattern of longer and shorter bursts, they activated their mother's voice on the tape recorder; a different sucking pattern activated the stranger's voice. The researchers found that infants sucked to hear their own mother's voice in preference to the voice of the stranger.

It could be argued, of course, that the infants heard their mother's voice from the time of birth and thus could have learned to prefer it in their first hours of life. To rule out this familiarity hypothesis, DeCasper and Spence (1986) designed another study in which 16 pregnant women were asked to read Dr. Seuss's famous children's book, *The Cat in the Hat*, to their fetuses twice a day for the last 6.5 weeks of pregnancy. Some remarkable results occurred. After birth, when these women's infants could suck in one distinctive pattern to hear their mother's tape-recorded voice read *The Cat in the Hat* or in another pattern to hear them read *The King, the Mice and the Cheese*, they sucked to hear *The Cat in the Hat*! Because in this test condition the mothers read not just one of the poems but both of them, it seems pretty clear that the babies preferred not their mothers' voices per se but their mothers' voices reading the poem to which the infants had been exposed prenatally.

Although these studies give us evidence that prenatal auditory experiences influence postnatal auditory preferences, we don't have a clear understanding of the exact mechanisms involved in prenatal learning. The sounds babies hear in utero, filtered through the mother's body and the amniotic fluid, must be different from the sounds of their mothers' voices as they hear them after birth. It may be that the component

Participants in experiments on fetal sensitivity to sound read *The Cat in the Hat* to their unborn babies. Whether such reading would give the baby a head start on learning language is still unknown, but the research showed that newborn babies prefer to hear not only their own mothers' voices but also the specific pieces of poetry or prose their mothers read to them before they were born.

of maternal speech to which the fetus responds is *prosody*. Prosody includes the rhythm, intonation, and stress of speech and is carried by the sound frequencies that are the least altered in the prenatal environment. Because both of the books the mothers in DeCasper and Spence's studies read to their babies are long poems but of very different meters, the infants may also have been expressing a preference for the familiar prosody.

The evidence is accumulating that newborns may exhibit a postnatal preference for a specific passage or melody experienced prenatally (Saffran et al., 2006). However, it is less clear what this preference indicates about later auditory development or any other aspects of development, such as the formation of the mother-child relationship. It is unlikely that these early experiences would produce the supreme benefits claimed by those who want to sell stereo sets for babies, and it's not likely either to raise babies' IQs or radically modify their social experiences after birth.

Babies can also locate where a sound comes from and judge how far away it is, which is referred to as auditory localization. Even newborns will turn their heads toward the sound of a rattle, suggesting that they know what direction the sound came from (Clifton, 1992). The development of auditory localization has a unique course

(Johnson, 1998). Babies are quite good at localizing sound in the first month of life, but between 2 and 3 months of age, this ability seems to wane. Then, by 4 months of age, babies can once again localize sounds well. This developmental pattern—which can be depicted graphically as a U-shaped curve because a period of high-level performance is followed first by a performance drop and then by another high-level performance—illustrates an interesting aspect about auditory development. The better performances seen in the first and fourth months of life are controlled by different brain regions. At 1 month of age, this ability is controlled by subcortical brain systems in place at this time. However, over the first few months of life, the cortical regions of the brain develop and eventually take over some of the functions previously controlled subcortically. Thus, this U-shaped curve actually represents a shift in the way auditory localization is controlled by the brain.

Between 6 to 12 months of age, even more complex auditory capabilities appear. Later in the first year, babies improve in their ability to determine a sound's distance, particularly in situations when a sound is getting closer (Morrongiello et al., 1991). The ability to perceive approaching sounds may develop early because it has survival value; the source of the sound may tell the listener whether an object in space is on a collision course with the listener.

The human auditory system appears especially sensitive to the sound of human voices (Saffran et al., 2006). Babies as young as 2 days old prefer to hear the human voice over other sounds, particularly a voice that is high in pitch with exaggerated pitch contours—the exact type of sound that makes up much of motherese, or infant-directed speech (Fernald, 1992). This preference for infant-directed speech, which is discussed at greater length in Chapter 7, plays an important role in language development and in the development of social relationships early in life. Infant caregivers may be aware of these preferences, for when they are with an infant, they often speak in a high-pitched voice and sing in a high-pitched and melodic fashion. The preference by infants for melodic songs, especially songs that are repetitive and have simple musical structures, may help explain why lullabies are sung throughout the world and are effective in soothing infants (Trainor, 1996; Winner, 2006).

Perhaps because infants have innate preference for the human voice as well as substantial experience with the human voice from early in life, babies learn to discriminate among voices very quickly. Even newborns can distinguish their mothers' voices from those of other female voices (DeCasper & Fifer, 1980). This ability facilitates the development of an emotional bond between parent and child. Even before babies can understand the words their parents say, the familiar tones and speech patterns of their mothers or other primary caregivers help form the foundation of the early parent-child relationship. Thus, early auditory skills, preferences, and experiences have functional significance for social development.

Finally, it is important to point out that despite the early and rapid developments in auditory abilities, hearing difficulties are rather hard to diagnose. In fact, deafness is often diagnosed as late as 2.5 to 3 years of age, which is a critical period for language acquisition. Because of the impact that hearing difficulties may have on other aspects of development, especially language acquisition, early and regular checks for hearing difficulties and ear infections, which can impair hearing considerably, are important. Interventions that begin as early as 6 months of age or younger are the most effective in supporting the development of language skills for children with hearing difficulties (Yoshinaga-Itano et al., 1998).

Vision: How Babies See Their Worlds

Some baby animals, such as kittens, cannot see at all for days after birth, but the eyes of a newborn human being are physiologically ready to begin responding to visual stimuli. Newborn humans can detect changes in brightness, distinguish movement in the visual

Figure 4-3

Visual discrimination in infants

At 1 week of age, infants can discriminate black stripes of this size from a gray field when they are a foot away from the target. This is only about one thirtieth as fine a discrimination as an adult with normal vision can make, but by the time infants are 8 months old, they see about one fourth as well as adults, and they achieve adult levels by the time they're about 5 years old.

Source: Maurer & Maurer, 1988.
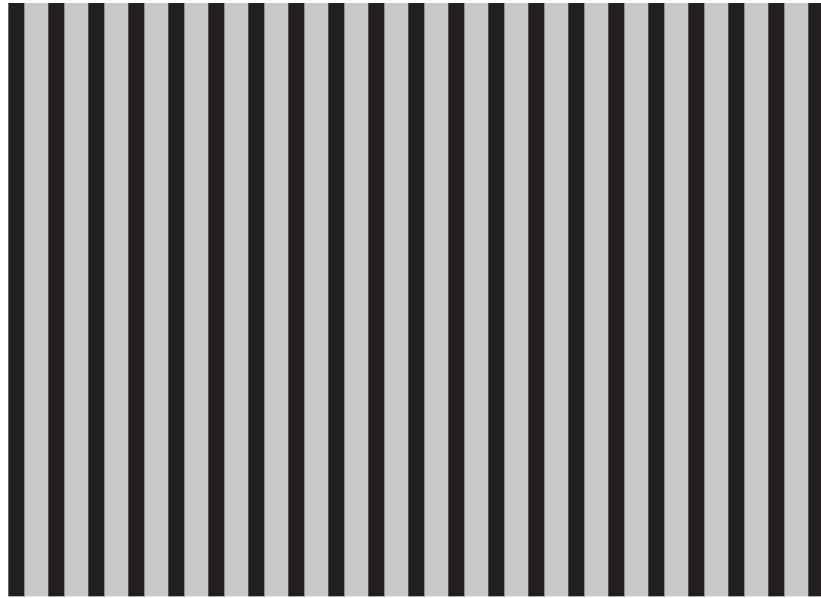
field, and follow or track a moving object with their eyes (Kellman & Arterberry, 2006). In this section, we look at several important aspects of visual development.

visual acuity Sharpness of vision; the clarity with which fine details can be detected.

THE CLARITY OF INFANTS' VISION   **Visual acuity** is sharpness of vision, or the clarity with which a person can detect fine details. Since it is harder to see the details of a small object than a big one, acuity and viewing distance are related. If from 20 feet away you can read a letter of the alphabet that people with perfect vision can read from 40 feet, you have 20/40 vision, a relatively small difference from the optimum of 20/20. The vision of infants under 1 month of age ranges from 20/200 to 20/800 (Courage & Adams, 1990). This means that most objects that are not held close to a baby's face appear as quite blurry and indistinct. Visual acuity improves rapidly over the next few months, however, and seems to be within the normal adult range by the time a child is between 6 months and a year old (Banks & Shannon, 1993). One way visual acuity is assessed in infants is by testing how sensitive a baby is to visual details such as the width or density of a set of stripes in a pictorial image. Figure 4-3 displays the finest black stripes that most 1-week-old infants can discriminate from a gray field when the image is 1 foot away. Gradually, babies develop the ability to detect more detailed patterns; thus, little by little, they are able to detect stripes that are closer together (Maurer & Maurer, 1988). To appreciate this ability to see details more clearly, examine Figure 4-4, which shows how well an infant can see a human face at 1 month and 1 year.

Figure 4-4

How well can infants see?

The photos represent a computer estimate of what a picture of a face looks like to a 1-month-old infant and 1-year-old infant. Infants at even 6 months can see quite well, and scientists presume that a child's vision continues to improve until it reaches the clarity of the normal adult's sight.

HOW BABIES SEE COLORS   Newborns have limited color vision. At 1 month, babies show little response to color, but 2-month-old babies can begin to see this feature of the environment. By 3 months of age, infants can distinguish among most colors and can group colors into basic categories, such as reds, blues, and greens (Teller & Bornstein, 1987). For instance, when presented with two shades of blue, a 3-month-old usually responds as if these colors are similar rather than two different color shades. By 4 months of age, infant color vision is similar to that of adults (Kellman & Arterberry, 2006).

The brain structures and neural pathways important in color discrimination are quite immature during the first weeks of life, which may account in part for the limited ability to discriminate color in very young infants. Research with infant monkeys indicates that early visual experience may be essential for normal color perception to develop (Sugita, 2004). In this study, the monkeys were raised, from 1 month of age, in a room in which the lighting was monochromatic, and they could not see the normal spectrum of colors. When their color vision was tested at 1 year of age, their ability to distinguish colors was much poorer than that of normally reared monkeys. With training in color perception, the monkeys reared in monochromatic illumination were able to develop some but not all of these abilities. Although these results pertain to monkeys and not humans, they suggest that early visual experience with color may be essential for normal color perception to develop.

Only 3 months old, this little girl seems quite fascinated by the patterns in her mobile. She may be perceiving the patterns in their entirety, whereas earlier she could distinguish only parts of them. Thus, as vision develops, the same stimulus arouses different types of interest from the baby.

HOW BABIES PERCEIVE PATTERNS   Psychologists have long debated whether the visual world of a young infant, like that of an adult, is organized into patterns or whether a baby sees merely unrelated lines, angles, and edges and only gradually learns through experience to perceive larger patterns. The nativist, or biological, position supports the first of these two viewpoints, arguing that pattern perception is innate. The empiricist, or environmental, position supports the second viewpoint and argues that experience is needed to piece the elements together into meaningful patterns. Most research findings suggest that both learning and experience are generally required to see patterns in an adult manner.

In one classic study, Salapatek and Kessen (1966) used an infrared camera to determine precisely where on a triangle newborns directed their eyes. They found that a newborn's gaze was not distributed over the whole triangle, as an adult's would be. The typical newborn centered attention on one of the triangle's angles but sometimes also scanned part of an edge in a limited way. This suggests that although certain elements of a complex pattern attract a newborn's attention (angles, edges, boundaries), babies this young may not perceive whole forms. If they did, they would have scanned the entire triangle more completely. The scanning of forms improves quickly with age, however. By the age of 2 months, babies visually trace both the edges of a pattern and the internal areas (Aslin, 1987; Kellman & Arterberry, 2006). This suggests that they have made some advances in seeing the various parts of a pattern in a unified way.

By 3 months of age, babies are almost as good as adults at picking patterns out of a moving form (Bertenthal & Clifton, 1998; Booth et al., 2002). For example, researchers use the technique of a point-light display to determine how infants interpret visual information from a moving form. If 10 or 12 points of light are attached to a walking person's head and major joints, and then an image of the person moving in a dark space is presented, adults quickly recognize this moving display as depicting a person. By testing babies 3 to 5 months of age with this same kind of stimulus, researchers have found that even infants this young can extract information about form from motion (Figure 4-5; Bertenthal et al., 1984). However, although infants 3 and 5 months old can

Figure 4-5

Extracting information about form from movement

Three- to 5-month-old infants are able to detect a form from an upright walking person specified by an 11-point-light display (a). However, these same age infants do not appear to recognize the inverted light display of a walking person (b) or when 11 light points are presented in a scrambled arrangement (c). This pattern suggests that the infants apply different understanding or meaning to the perceptual displays and do not perceive these stimuli as just a collection of individual points of light.

Source: Bertenthal, Proffitt, & Kramer, 1987.

(a)   (b)   (c)
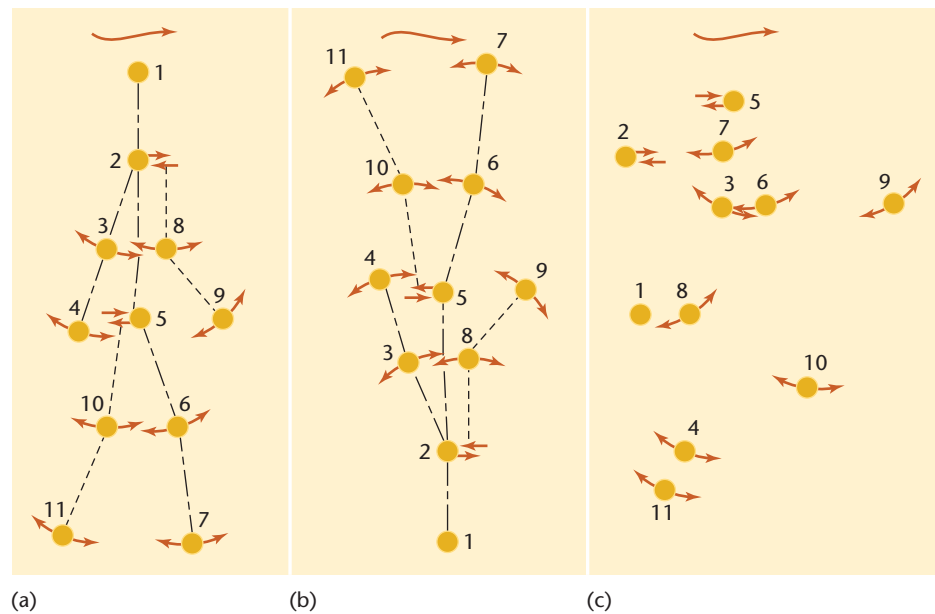
extract a human figure's structure from information about its motion, they don't seem to recognize the form as a person until they are somewhat older—around 9 months of age (Bertenthal et al., 1987).

A PREFERENCE FOR FACES   Faces are complex patterns. Although all human faces are arranged similarly, there are many differences across individual faces. In addition, any single face can be experienced from various angles and with different expressions. Despite this visual complexity, research indicates that the infant's ability to perceive faces develops rapidly in the first year. This development is aided by what appears to be an innate preference for human faces. Newborns as young as 30 minutes old show a preference for images that are facelike compared to images that are not (Johnson et al., 1991; Mondloch et al., 1999). This early bias toward faces is then combined with a neural system that supports the rapid learning of faces and a human environment that provides extensive, and often close-up, experience with faces (Kellmann & Arterberry, 2006). Together, these factors result in a developmental course in the particular type of pattern perception that is truly remarkable.

Early and rapid changes in face perception are evident in how babies scan faces. As you can see in Figure 4-6, infants 1 month old tend to scan the outer contours of the

Figure 4-6

How infants scan the human face

A 1-month-old baby sticks pretty much to the outer perimeter of the face, although he shows some interest in the eyes. An infant who is 2 months old scans more broadly and focuses on the features of the face. She pays a lot of attention to the eyes and mouth, which suggests that some pattern detection may be occurring.

Source: Maurer & Salapatek, 1976.
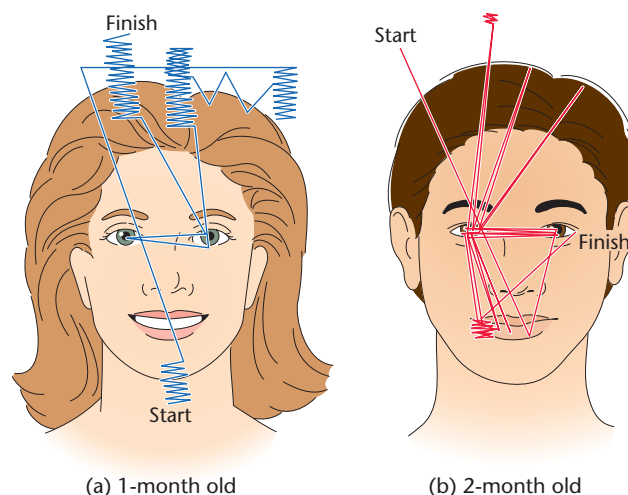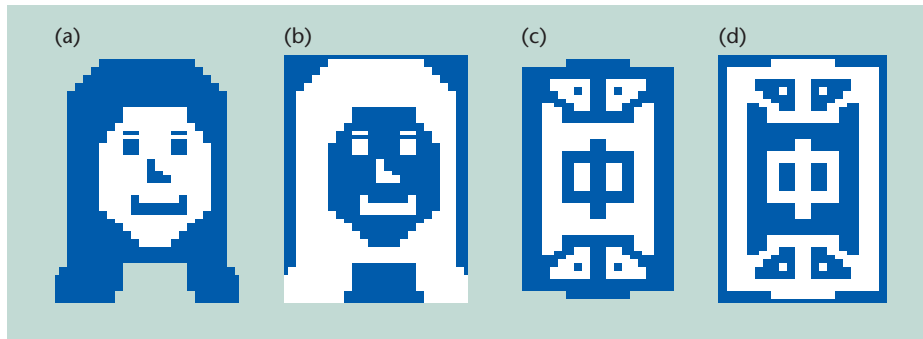
(a) 1-month old   (b) 2-month old

face; however, by 2 months of age, infants concentrate on internal features (Maurer & Salapatek, 1976). Other researchers, using real adult faces, have found these same developmental changes in infants' scanning (Haith et al., 1977). These investigators highlighted a finding that can also be seen in Figure 4-6. Not only did 7-week-old infants spend less time on the contours of real faces, but they also looked at the eyes more than the younger infants did. But the fact that internal facial features, especially the eyes, strongly draw the attention of infants by 7 weeks of age does not mean that babies this young are seeing faces as unified wholes. Facial features may simply have an abundance of perceptual qualities, such as contour, contrast, and movement, that are intrinsically appealing to the infant. Even the discovery that newborns prefer their mothers' faces to the faces of strangers does not necessarily mean that newborns are seeing faces as adults do (Walton et al., 1992). Instead, the newborn's recognition of and preference for the mother's face may simply reflect the baby's focus on one particular feature of her face. In fact, Pascalis and his colleagues (1995) found that 4-day-old newborns looked longer at their mothers' faces than at those of strangers only when the mother was not wearing a head scarf. This may suggest that the hairline and the outer contour of the face play an integral part in the newborn's face recognition.

Some research suggests that the pattern of information present in faces—for example, the great number of high-contrast areas seen in the upper portion of the face pattern—is preferred by newborns (Turati et al., 2002). This suggests that rather than being born with sensitivity to human faces per se, babies may be biased toward particular types of patterns that happen to coincide with the type of information presented in faces. In one experiment, researchers showed 1.5- and 3-month-old infants the computer-generated stimuli displayed in Figure 4-7 (Dannemiller & Stephens, 1988). Although stimulus (a) looks much more facelike than stimulus (b), the two are identical except that the shading is reversed. At 1.5 months, babies showed no preference between these two stimuli, but at 3 months, they looked longer at (a), which is more easily seen as a face. Note that this was not simply because they had a preference for pictures with black borders and white interiors, for they showed no preference for stimulus (c) over stimulus (d). These findings suggest that by 3 months of age babies identify a face as a unique pattern. The shift from perceiving parts to perceiving whole patterns appears to occur at about the same time for both objects and faces. However, infants continue to look longer at, and show more brain activity in response to, faces as compared with objects (Johnson, 2000; Nelson, 1999a).

Over the first year, infants also come to process facial information more quickly. A study of facial recognition found that, whereas 7-month-olds needed 14 trials to know a face well enough to recognize it reliably, 12-month-olds needed only about 9 trials (Rose et al., 2002). As we will see in Chapter 9, greater speed of processing is one consistent characteristic of cognitive change associated with age. The ability to extract information from stimuli quickly and reliably is a keystone of developing intellectual ability.

Beyond a general interest in faces, babies seem to prefer faces that are attractive. Judy Langlois and her colleagues (1987) showed groups of infants who were 2 to 3 months old and 6 to 8 months old color slides of women's faces. The researchers presented these slides in pairs: One of each pair had been rated attractive by adult judges; the other had been rated unattractive. Both the younger and the older babies looked longer at the attractive faces. In later research, Langlois and her colleagues (1990) supported their original findings, using both dolls that had been judged attractive or unattractive and adults who wore lifelike latex theatrical masks that had also been judged either attractive or unattractive. One-year-old children played more with the attractive doll and preferred to interact with the adults wearing the attractive mask, smiling at the adult, laughing, and withdrawing less often from him or her than from the person wearing the unattractive mask (see also Langlois et al., 2000; Rubenstein et al., 1999).

Why do infants prefer attractive faces? Some argue that such faces contain more of the features that the infant's visual system is organized to react to: Infants prefer high contrast, contours, curves, and vertical symmetry, and attractive faces may have more of these characteristics than unattractive faces. However, some research has shown that when attractiveness and symmetry are varied independently—for example, an attractive face that lacks symmetry or an unattractive yet symmetrical face is presented— babies, like adults, prefer attractiveness to symmetry (Samuels et al., 1994). Thus, rather than symmetry explaining attractiveness, some suggest that there might be something about an attractive face that is interesting to babies. When faces identified as attractive have been examined more closely, what seems common across them is the averageness or prototypical aspects of these faces. It may be that their averageness is what makes attractive faces interesting to babies and adults alike (Slater, 2000). Attractive faces may simply be more average or facelike than unattractive faces. They are seen as better examples of faces because they contain many of the familiar features of other faces and are therefore more readily classified as a face. Or alternatively, it may be that average faces are interesting because they are more difficult and time-consuming to process, especially to determine what makes such faces distinctive from other faces. We need a better understanding of why both infants and adults are interested in faces that judges have identified as attractive (Langlois et al., 2000).

Exactly how babies develop these impressive face-processing abilities is a subject of much debate. The evidence that newborns are predisposed toward faces suggests that there is some innate human ability that is important to this development (Johnson, 2005). However, experience clearly plays a vital role because this bias needs to be elaborated and fine-tuned over the first year of life. Some researchers argue that pattern-based learning of this type is not specific to faces, but because faces are particularly important for infants to learn about, they learn about them quickly (Nelson, 2001).

According to this view, over the first year of life, infants use their powerful general learning capability to process their many experiences with human faces. Gradually, this face-processing system learns to focus on the types of faces most important for infants—namely, human faces—with importance determined by frequency of exposure (Turati, 2004). Evidence by Pascalis, de Haan, and Nelson (2002) supports this claim. They found that both 9-month-olds and adults could discriminate between pictures of human faces. However, neither these infants nor adults were able to distinguish between different faces of monkeys. In contrast, 6-month-olds are able to discriminate facial information for both human and monkey faces. Essentially, face processing by human infants becomes specialized to human faces over the first year of life. This pattern is similar to the specialization that occurs in the development of speech perception (Werker & Vouloumanos, 2001), which we discuss in Chapter 7. The idea that learning in infancy is regulated by a general rather than a specific set of processing systems brings these two similar and important learning patterns together and suggests that infants have the ability to learn—and to learn rather rapidly—the many types of complex information that are important to their survival.

DEPTH PERCEPTION   Newborns' eyes do not work together in the way that the eyes of older children and adults do. The eyes of newborns move in the same direction only about half the time (Kellman & Arterberry, 2006; Mauer & Mauer, 1988), so young infants must rely on depth and distance cues available to each eye independently. Some of these cues involve motion. As objects approach us, they fill more of the visual field, and when we move our heads, the images of close objects move more than the images of distant objects. These kinds of changes associated with movement help babies judge depth. The ability to perceive depth improves with age, as eye coordination develops and more cues to depth and distance become available to the infant (Johnson et al., 2003).

By 3 to 5 months of age, babies can coordinate their two eyes, and they can begin to see depth as adults do, using stereoscopic vision (Birch, 1993; Mohn & van Hof-van Duin, 1986). **Stereoscopic vision** is the sense of a third spatial dimension, depth, produced by the combination of the images perceived by both the left and the right eye, each of which reflects the image from a slightly different angle. The brain's fusion of these two images creates the perception of depth. Proper use of the two eyes together at an early age is necessary for normal stereoscopic vision to develop. Babies born with crossed eyes (a condition called *convergent strabismus*) usually do not develop normal stereoscopic vision unless the eyes are surgically corrected before the age of 2 (Banks et al., 1975; Banks & Salapatek, 1983).

The ability to perceive depth has much practical value. For example, it helps keep us safe by preventing us from walking off cliffs and other high places. In fact, as this example suggests, depth perception is critical to survival. Thus, researchers have wondered if this knowledge is innate or built up from experience in some way. To investigate this issue, Gibson and Walk (1960) developed an apparatus called the visual cliff (see Figure 4-8). The **visual cliff** consists of an elevated glass platform with a pattern of some type directly beneath the glass on one side (the "shallow" side) and the same pattern several feet below the glass on the other (the "deep" side). Gibson and Walk found that babies 6 to 14 months old would not cross from the shallow to the deep side to get to their mothers even when the mother encouraged the child to do so. Thus, babies this age were fearful enough of heights to avoid them.

stereoscopic vision The sense of a third spatial dimension, that of depth, produced by the brain's fusion of the separate images contributed by each eye, each of which reflects the stimulus from a slightly different angle.

visual cliff An apparatus that tests an infant's depth perception by using patterned materials and an elevated, clear glass platform to make it appear that one side of the platform is several feet lower than the other.

Figure 4-8

Babies don't take chances

This baby is hesitant to venture beyond the safety of the visual cliff's "shallow" side, despite mom's coaxing. Clearly, the child perceives the "deep" side as threatening.

This fear apparently does not exist in very young infants. When Campos and his associates (Campos, Langer, & Krowitz, 1970) placed 1.5-month-old babies first on the shallow side of a visual cliff and then on the deep side, the infants' heart rates decreased, which generally indicates interest rather than fear (fear is normally accompanied by an increase in heart rate). In contrast, when researchers placed older infants who could crawl on the deep side, these babies showed heart-rate accelerations, suggesting that they had learned to be afraid of heights (Campos et al., 1978). Apparently, experience with locomotion is involved in the development of a fear of heights. Baby animals that are able to walk shortly after birth avoid the deep side of the visual cliff when they are only 1 day old. And when human infants who are unable to crawl are provided with 30 to 40 hours of experience in wheeled walkers, they begin to show fear of high places (Bertenthal et al., 1994; Campos et al., 1992). It is important to point out that in this research the investigators were able to disentangle depth perception and fear of heights. Although these are related understandings of the world, they have different courses of development.

A final, interesting question about these findings asks: What is it about locomotion that triggers a fear of heights? Perhaps motion itself helps a baby to judge distances more accurately. Or perhaps moving about on one's own gives the baby an opportunity to fall, and as a result, he begins to recognize heights as potentially dangerous. When an infant falls or even nearly falls, the strong emotional reaction displayed by the caregiver may also prompt the baby to learn to fear heights (Campos et al., 1992; Lamb & Campos, 1982). Whatever the link, a fear of heights involves an interplay of biology and experience.

SIZE AND SHAPE CONSTANCY   Regardless of how distant an object is, you can judge its size and shape. For example, even though a truck looks toylike from far away, you still perceive it as a normal-sized vehicle. This ability relies on **size constancy**, the tendency to perceive an object as constant in size regardless of changes in the distance from which you view it and regardless of the associated changes in the size of the object's image on the retinas of your eyes (see Figure 4-9). Research with newborns suggests that this basic ability may be present from birth (Slater et al., 1990). However, demonstrating that a newborn displays this or any other ability does not mean that the ability is fully developed. As binocular vision develops, between 4 and 5 months, recognition of size constancy improves (Kellman & Arterberry, 2006).

Analogous to size constancy, **shape constancy** is the ability to perceive an object's shape as constant despite changes in its orientation and hence the angle from which one views it. The fact that even newborns are capable of shape constancy suggests that this ability may be present at birth, requiring minimal experience with the world (Slater & Morison, 1985). Perhaps as researchers further improve their techniques for probing

size constancy The tendency to perceive an object as constant in size regardless of changes in its distance from the viewer and in the image it casts on the retinas of the eyes.

shape constancy The ability to perceive an object's shape as constant despite changes in its orientation and the angle from which one views it.

Figure 4-9

Size constancy

The two blocks pictured here are exactly the same size, and the viewer perceives them as the same size. However, because they are placed at different distances from the viewer, they cast retinal images of different sizes. Four-month-old infants will see the blocks as different sizes, but by 6 months, babies have grasped the concept of size constancy and see the blocks as the same size.
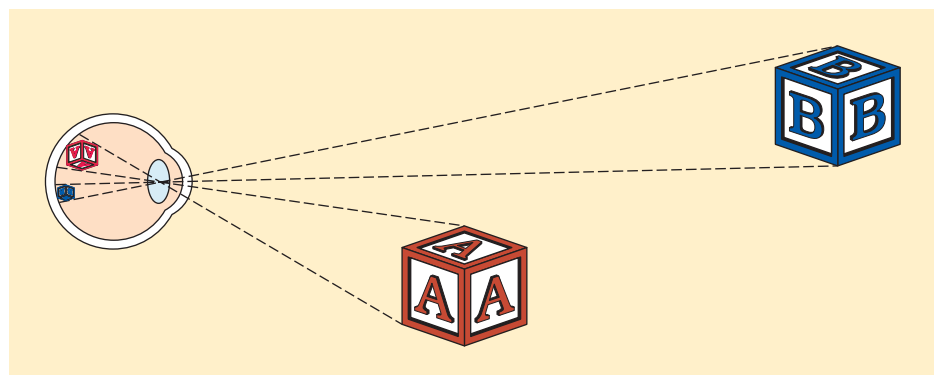
infants' visual capacities, we will find evidence of even earlier competence in some other areas as well.

VISUAL EXPECTATIONS   Not only do babies begin to perceive colors, forms, depth, and perceptual constancies at an early age, but they also soon start to develop expectations about events in their visual worlds (Haith & Benson, 1998). To demonstrate this remarkable ability, Haith and his coworkers (Canfield & Haith, 1991; Haith et al., 1988) presented pictures to babies in either a regular alternating sequence (left, right, left, right) or an unpredictable sequence (left, left, right, left, etc.). When the sequence was predictable, 3-month-olds began to anticipate the location of the next picture by looking to the side on which it was going to appear. And they developed this pattern of expectation in less than a minute! Younger infants did not show this ability to anticipate a picture's location based on a regular sequence. It may be that more cognitive or perhaps biological development is needed for this ability to emerge (Tamis-LeMonda & McClure, 1995).

Experience seems to contribute to the ability to perceive the trajectory or continuity of an object when part of the object or array of objects is obscured from view. Johnson and his colleagues (2003) showed 2- to 6-month-old infants a line or row of objects partly occluded by a screen—for example, a line of balls with several of the balls in the center of the image covered up by a screen. Two-month-olds showed little awareness of the continuity of the line of balls; 6-month-olds were aware of it; and 4-month-olds showed such awareness only when the occlusion period was of short duration (67 milliseconds, or ms). It seems that the understanding of perceptual continuity emerges over the first 6 months of life. This type of understanding helps set the stage for more complex understanding of objects, discussed at greater length in Chapter 8.

This study, like others we have discussed, shows that the infant's overall level of visual ability is much greater than had been presumed only a few decades ago. It also indicates that even though the development of vision is greatly influenced by biology and its progress is rapid in the first year, visual experience plays a crucial role in this process (Johnson, 2004).

Smell, Taste, and Touch

Like vision and hearing, smell, taste, and touch are well developed at an early age. For instance, even newborns can discriminate among a variety of odors, and they show "appropriate" facial expressions in response to odors that adults rate as either pleasant or aversive. In one study, infants less than 12 hours old reacted to the odors of strawberry and banana with a look of satisfaction, whereas a whiff of fish or rotten eggs elicited a rejecting look (Steiner, 1979).

Young infants' well-developed sense of smell seems to provide another early guide to the people and things in their world. Macfarlane (1975) showed that 1-week-olds could distinguish the odor of their own mother's breast pad from the odor of the breast pad of another nursing woman, a stranger to the infants. When the two pads were positioned above the infant's head, the baby turned toward the mother's pad more frequently than toward the other pad. This preference was not evident in the first few days of life and seems to depend on babies learning to recognize the mother's special smell.

Newborns also respond selectively to different tastes. In one study, 2-hour-old infants produced facial expressions in response to sweet, sour, bitter, and salty substances that are similar to the faces adults make when given these tastes (Rosenstein & Oster, 1988). Because these infants had not been fed anything but milk or formula, it appears that at least some taste preferences may be innate. However, it is important to stress that just because a taste preference is evident at birth, this does not rule out the possibility that *learning* occurred before birth and that the preference is not innate but learned. Research has shown that the human fetus can learn to like or avoid certain tastes (Hepper, 1992;

Molina et al., 1995). Studying how learning about taste can occur in utero may be very important for understanding later development, such as how exposure to certain teratogens, like alcohol, might influence behavioral development after birth (le Canuet et al., 1995). In addition to learning about taste preference that may occur before birth, research has shown that such preference can develop in very early infancy. Mennella and Beauchamp (1996) found that infants exposed to vanilla-flavored milk were more accepting of the flavor of vanilla later on. Babies will accept garlic-flavored milk if exposed to garlic during breast-feeding. Animal studies indicate that the more varied the mother's diet, the more likely offspring are to consume novel foods after weaning (Mennella & Beauchamp, 1993). Perhaps one benefit of breast-feeding is that "it provides an opportunity for the infant to become familiar with the flavors of the foods of her or his mother, family and culture" (Mennella & Beauchamp, 1996, p. 19).

The sense of touch is activated long before birth (Field, 2001b); indeed, it may be one of the first senses to develop. As Klaus and colleagues (1995) point out,

> The skin is the largest sense organ of the body . . . , [and] babies are surrounded and caressed by warm fluid and tissues from the beginning of fetal life. . . . [Moreover,] the lips and hands have the most touch receptors; this may explain why newborns enjoy sucking their fingers. (p. 52)

Babies are clearly responsive to different types of touch. They show positive reactions to gentle stroking and usually negative reactions to sudden changes in temperature or texture and to uncomfortable pressure on the body—for example, when blood is drawn for testing.

Although it was once assumed that newborns were indifferent to pain, this is untrue. In fact, they are more sensitive to pain than older infants (Axia et al., 1999). Evidence of the infant's sensitivity to painful procedures comes from studies of infant stress reactions; for example, male infants have shown higher levels of plasma cortisol (a stress marker) after a circumcision than before the surgery (Gunnar et al., 1985). Although it was once standard practice to perform circumcision and other invasive medical procedures on infants without using any pain-relieving drugs, advances in our understanding of the newborn's sensitivity to pain have changed these practices.

Not only do babies respond to touch—recall the positive impact that massage had on preterm babies (Field, 2001a)—but before the end of their first year, they can learn to discriminate among objects using only their sense of touch (Streri & Pecheux, 1986). Researchers found that 2-day-old infants showed habituation to an object placed in their hands, suggesting that tactile, or haptic, information can be learned at this early age (Streri et al., 2000). After the infants habituated to the first object, the researchers placed a new object in the baby's hands—and holding time increased. Videotape analysis showed that the infants were not just grasping the objects rigidly; small movements of the baby's fingers were observed. These observations suggest that neonates have tactile sensitivity to object shape and that they use touch to explore the environment and encode this information.

Intermodal Perception: How Infants Coordinate Sensory Information

intermodal perception The use of sensory information from more than one modality to identify a stimulus and make sense of it; also, the identification of a stimulus already identified by means of one modality by the use of another modality.

Most of the time, information comes into our senses through more than one sense modality. When do infants begin to coordinate information from different sensory sources into a single unified perception? For instance, when an infant sees a ball bounce or hears her father speak to her, does she perceive separate visual and auditory events? Or does she match the sight of the moving ball with the sound the ball makes as it hits the floor and the sight of her father's mouth movements with his voice? **Intermodal perception** is the use of sensory information from more than one modality—in these examples, both vision and hearing—to identify a stimulus and make sense of it.
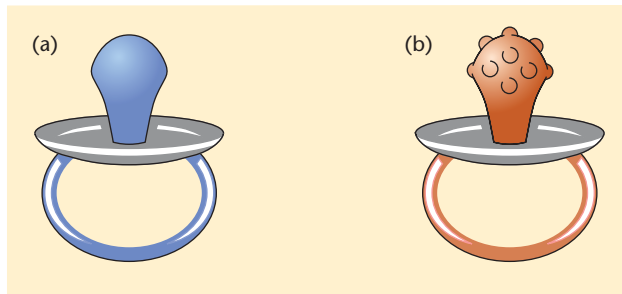
Figure 4-10

Testing a baby's intermodal perceptual abilities

Just by looking at these pacifiers, 4-week-old babies knew which one they had sucked earlier, whether it was smooth (a) or knobby (b).

Source: From *Nature, 282* (1979), pp. 403–404. Meltzoff, A. N. and Borton, R. W., "Intermodal matching by human neonates." © 1979 Macmillan Journals Ltd. Reprinted with permission of Nature Publishing Group.

Researchers have explored babies' ability to perceive intermodally by pairing two different sensory systems, such as vision and touch or vision and hearing. Exploring the first of these pairs, Meltzoff and Borton (1979) designed two different pacifiers, one smooth and one knobby (Figure 4-10), and gave 4-week-old infants a chance to suck one or the other. Later, when the researchers let their small participants look at both pacifiers—but not suck on them—the infants looked longer at the pacifier that they had sucked on earlier than at the unfamiliar one. Given that infants this age have had little opportunity to simultaneously touch and look at objects, the researchers concluded that human beings are able to recognize and coordinate information obtained from different sense modalities (Meltzoff, 1981).

To rule out the possibility that experience might have played a role in these findings, Kaye and Bower (1994) tested newborns who were solely breast-fed and had no experience with a pacifier. These newborns, too, showed a visual preference for the pacifier they had been sucking on after only 20 seconds of exposure. These findings suggest that infants are probably born with the capacity for intermodal perception. And over the first year, with added experience, infants improve markedly in this ability (Maurer et al., 1999).

Studying when infants can coordinate vision and hearing, Elizabeth Spelke (1987) used two animated films and accompanying sound tracks of a kangaroo and a donkey, each bouncing at a different rate and producing sounds in keeping with its bouncing. Spelke then showed these two films, side by side, to 4-month-old babies as she played only one of the soundtracks from a speaker positioned between the two screens. The infants looked at the animal whose bouncing "matched" the sounds they were hearing. Because the infants had never seen or heard these animals, their reactions were clearly not the result of prior learning. Other studies have shown that babies this age can also match the sounds of particular words being spoken with the sight of a face whose lips are synchronized with those sounds, even though, as in the prior study, the visual stimulus is in one location (on a screen) and the auditory stimulus is in another (from a speaker positioned elsewhere) (Spelke & Cortelyou, 1981).

Intermodal matching can also help infants determine whether an object is approaching or retreating. Pickens (1994) showed 5-month-old infants films with soundtracks depicting a toy train either approaching the viewers or moving away from them (see Figure 4-11). Infants looked more at the approaching film when the decibel level of the sounds of the train increased and more at the retreating train when the sound of the train diminished. Infants did not show evidence of matching in other conditions in which the soundtracks were paired with videos depicting changes in the brightness of the train's image or showing the train moving horizontally with no change in its size. This experiment suggests that infants are able to integrate visual and sound information and can then use this information to help them judge distance.

The findings we've discussed in this section challenge the commonly held view that babies begin life experiencing unrelated sensations in each sensory system and only gradually learn to put the separate pieces together. Babies as young as 1 month can integrate vision and touch, and babies as young as 4 months appear to experience a world of integrated visual and auditory sensations.

Combining vision and hearing to detect distance and direction

Babies can match an engine sound that is becoming louder with the toy train in (a), which is approaching the watching infant, and an engine sound that is growing fainter with the train shown in (b), which is moving away from the infant.

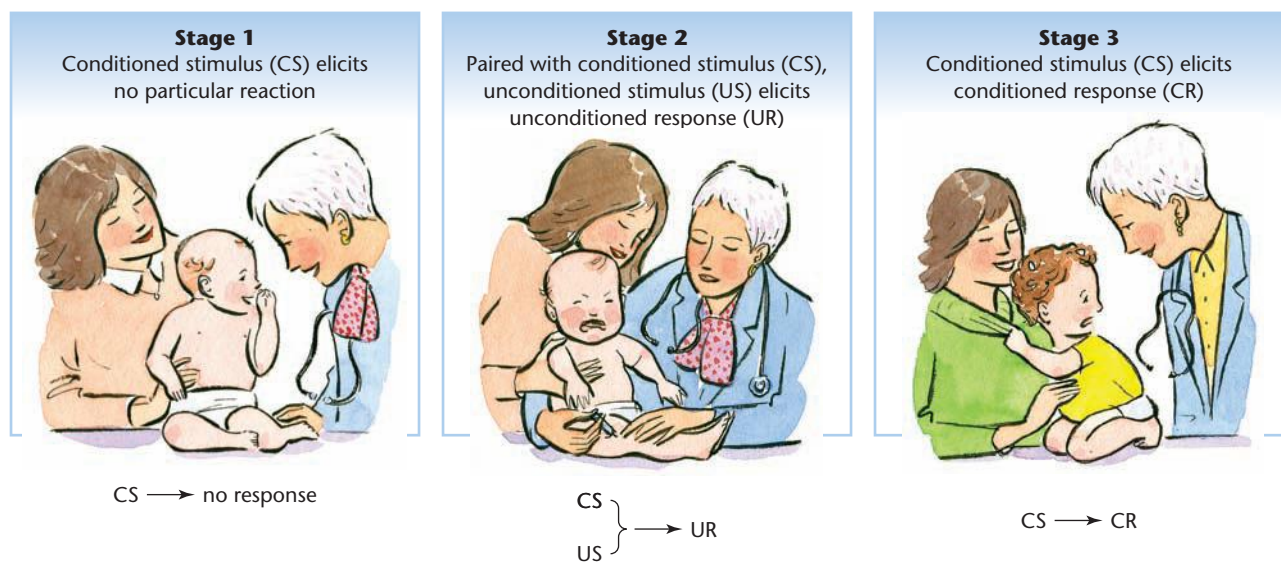Source: Pickens, 1994.

(a)

(b)

EARLY LEARNING AND MEMORY

Our discussions so far have concentrated on a particular kind of infant learning—that is, what babies know about the world's objects and their properties. Much of the research we've described has assumed that as babies develop and have experience interacting with people and things, they learn more about the world. How babies learn—in fact, how all humans learn—is a topic of long-standing interest to psychologists. As you

will recall from Chapter 1, psychologists have been particularly interested in learning through imitation and learning through association, as in classical and operant conditioning. In this section, we not only explore these kinds of learning in infants, but we also consider what these and other kinds of learning abilities tell us about a baby's memory capabilities. As you will see, basic learning processes appear to be present very early in life. What changes over the course of development seems to be the nature of the information that babies are capable of learning and the speed and efficiency with which they learn.

Classical and Operant Conditioning

For years, psychologists have debated the issue of how early babies can learn through classical conditioning, and the controversy is not over (Rovee-Collier, 1997). For a refresher on the mechanisms of classical conditioning, look at Figure 4-12, in which we diagram the way a child might become conditioned to fear his doctor. There is some evidence that newborns can learn by association or conditioning, especially in biologically meaningful contexts such as feeding. In one study, babies as young as 2 hours old learned to associate a stroke on the head with delivery of a sugar solution to their mouths, until eventually the stroke alone elicited puckering and sucking responses (Blass et al., 1984). However, newborns have more difficulty learning associations that involve unpleasant stimuli, such as loud noises or things that are painful (Rovee-Collier, 1987). Perhaps because human infants have parents to protect them, it may be less critical at an early age to learn stimuli associated with unpleasant events. And interestingly, there is evidence that neurological mechanisms aiding the formation of negative associations develop later than neurological mechanisms aiding positive associations (Rovee-Collier, 1987, 1999; Rovee-Collier & Shyi, 1992).

Operant conditioning involves learning to exhibit (or inhibit) some behavior because of the rewarding (or punishing) consequences it brings. Just as babies can be classically conditioned, they can also learn by operant conditioning (Gewirtz & Peláez-Nogueras,

Stage 1	Stage 2	Stage 3
Conditioned stimulus (CS) elicits no particular reaction	Paired with conditioned stimulus (CS), unconditioned stimulus (US) elicits unconditioned response (UR)	Conditioned stimulus (CS) elicits conditioned response (CR)

CS ⟶ no response

CS ⎫
     ⎬ ⟶ UR
US ⎭

CS ⟶ CR

Figure 4-12

How a baby may be conditioned to fear a doctor

At their first meeting (stage 1), the baby may show no particular reaction to the doctor, but after the doctor gives the baby a painful injection that causes the baby to cry (stage 2), the baby may expect the same pain at his next meeting with the doctor (stage 3) and cry or act afraid even if he doesn't see a needle in her hand.

1992). In the study we described in Box 4-2, DeCasper and Fifer (1980) used operant conditioning to induce sucking in newborns, with the mother's voice as a reward. The rates of sucking and the reward become associated with one another and are used to organize behavior. This research shows not only an early capacity for this kind of learning but also what seems to be a built-in propensity to enjoy contact with other human beings (which is why the sound of the mother's voice could serve as a reward). As in the case of classical conditioning, successful demonstrations of operant conditioning in newborns typically involve behaviors such as sucking or turning the head (related to the rooting reflex), behaviors that are components of feeding and thus of considerable importance to the baby's survival. Researchers take advantage of these early behaviors to investigate how infants learn specific behaviors.

Learning Through Imitation

Acquiring behaviors through classical or operant conditioning (displaying a behavior, being rewarded, repeating the behavior, being reinforced again, etc.) is uneconomical in terms of time and energy because, to be learned, the behavior has to be experienced directly by the infant. Fortunately, infants are able to learn a great deal without any overt conditioning but simply by observing the behavior of other people. As you learned in Chapter 1, this is observational learning or learning through imitation.

Imitation begins early in life; it may even be possible in the first few days after birth. Meltzoff and Moore (1983), for example, found that babies between 7 and 72 hours old imitated adults who opened their mouths wide or stuck their tongues out—movements that are components of the sucking response. These findings are somewhat controversial. Many developmental theories, such as Piaget's, argue that imitation requires the capacity for symbolic representation, which is generally not achieved until the end of the second year of life (Chapters 1 and 8). Others argue that the infant who sticks his tongue out at the sight of an adult doing the same thing may not be truly imitating another's behavior (Anisfeld, 1991). There is evidence that the sight of any protruding object may cause newborns to stick out their tongues not in imitation but because they see these objects as suckable.

This man and his little son are playing an age-old game that's fun for dad and instructive for baby. Imitation may be the sincerest form of flattery, but in newborns, it's a basic way of learning!

Babies, however, are soon capable of genuine imitation (Meltzoff & Prinz, 2002). Six-month-olds can imitate a series of modeled behaviors (e.g., shaking plastic eggs filled with pebbles) immediately after seeing the behaviors, and 9-month-olds can carry out these imitations both immediately after seeing them and after an interval of 24 hours, with no opportunity to practice the behaviors in between (Herbert, Gross, & Hayne, 2006). At 14 months of age, infants can delay (or defer) imitation for 1 week (Meltzoff, 1988). And between 14 and 18 months, they can not only defer imitation, but they can also generalize it to new settings. For example, children this age who saw a peer model a new behavior at day care could imitate that behavior 2 days later in their own homes (Hanna & Meltzoff, 1993). By 2 years of age, children can reproduce behaviors later even when the materials they use to carry out the behaviors have changed (Herbert & Hayne, 2000).

What mechanisms underlie the ability of babies, especially young ones, to imitate behaviors that they see others perform? The answer is still unclear, but the process involves some form of intermodal matching (Meltzoff, 1990; Nelson et al., 2006). For instance, newborns might form cognitive representations of the behavior they saw a model perform; they would then have to translate these initially visual perceptions into movements and actions that

they themselves could perform. This interpretation suggests that babies may be ready for some form of representational thought at an earlier age than had been proposed and that imitative learning relies on transforming these representations into action.

Memory in Babies

Even very young infants can remember what they see and hear over relatively long time spans. Two researchers found that newborns could remember a previously seen visual event over a 24-hour period (Werner & Siqueland, 1978). The babies in this study altered their sucking patterns when the color and pattern of a visual stimulus changed, even though they had not seen that stimulus for nearly a day. Other studies show that newborns can also remember speech sounds over a similar time period (Bauer, 2006; Swain et al., 1993; Ungerer et al., 1978). In one study of mothers and their 14-day-old infants, the mothers repeated the words *tinder* and *beguile* to their babies 60 times a day for 13 days (780 exposures); as you may imagine, 2-week-olds rarely hear these particular words. At 14 and 28 hours after this training ended, the researchers tested the babies' memory for the words. The infants showed not only that they remembered the words but that they also recognized them better than their own names.

Older babies have even more impressive memory capabilities. In one study, 3-month-old infants first learned to make a mobile move by kicking one leg, to which the researcher had attached a long ribbon that was also attached to the mobile suspension bar (see Figure 4-13) (Rovee-Collier & Gerhardstein, 1997). Usually, babies this age will forget the connection between a kick and a bobbing mobile after about 8 days. However, with a brief reminder before the testing period, infants could remember the connection for as long as 4 weeks. The reminder, provided about 24 hours before the memory test, consisted simply of letting the babies see the mobile bobbing up and down for 3 minutes. During the reminder session, the babies' legs were not attached to the mobile, so they could not relearn the connection. The visual reminder was enough, however. Babies who had experienced the reminder kicked their legs more often in the testing session (when the ankle ribbon was again attached) than babies who had learned the leg-mobile connection but who had been given no reminder of it in the interim.
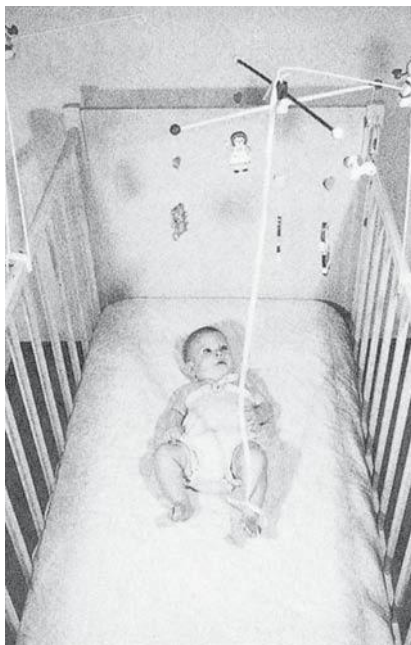
(a)

(b)

Figure 4-13

Memory lessons for babies

Rovee-Collier found that when she taught 3-month-old infants to make a mobile move by attaching the mobile to one of their legs with a ribbon (a) the babies forgot the association between kicking and moving the mobile after about a week. When this researcher gave these infants a "reminder" session, however, during which she removed the ribbon so that they could look at the mobile but couldn't make it move (b) and then reattached the ribbon (as in a), she found that most babies were able to remember the association for as long as 4 weeks.

Source: Rovee-Collier, 1986.

Making the Connections 4

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 4 and discussions in other chapters of this book.

Chapter 4
Infancy: Sensation, Perception, and Learning

Infant imitation is informed by social learning theory.
In Chapter 1, "Child Development: Themes, Theories, and Methods," p. 11

Infant ability to develop regular sleep patterns is linked with temperament.
In Chapter 2, "Heredity and the Environment," p. 65

Infants' perception of faces is linked with their ability to develop close relationships with caregivers.
In Chapter 6, "Emotional Development and Attachment," pp. 203; 211
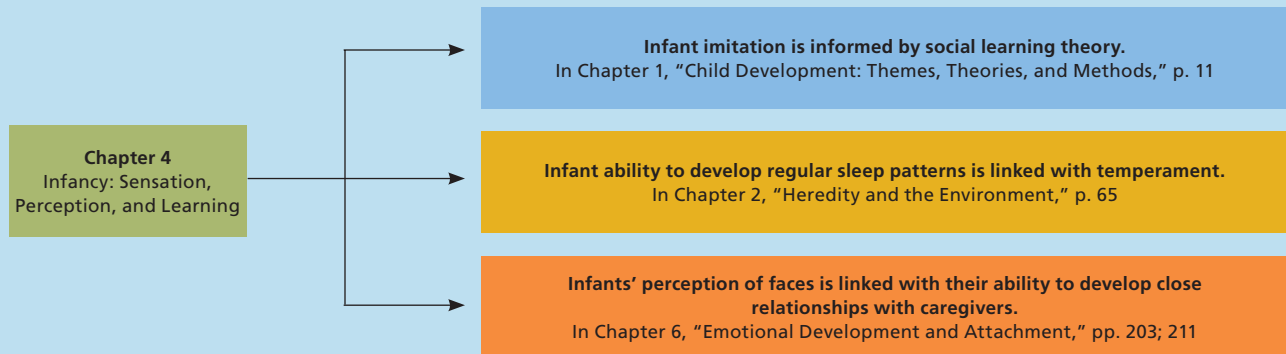
Another cue that helps babies remember is the context or setting in which the original learning took place (Rovee-Collier, 1999). Babies were able to remember better when tested in the same setting in which they originally learned, such as the day-care center, rather than in a novel context, such as the laboratory (Hayne et al., 1997).

From the age of 3 months, babies' memory abilities improve even further. Consider a study in which infants who were about 10 months old saw pictures (e.g., a whale), touched objects (e.g., a clothespin), or heard sounds (e.g., a bell or a rattle). Upon returning to the laboratory when they were 3 years old—2 years later—the children were more likely to touch the objects and recognize the sounds that they had been exposed to on their earlier visit than were children in a control group who had not had the earlier experience in the lab (Myers et al., 1987). This study suggests that children have some memory of events that happened to them before they could even walk or talk. Similar evidence comes from the research of Bauer (1996, 2002), who found that 13-month-old infants were able to remember a simple sequence (e.g., putting teddy bear to bed) after an 8-month delay (Figure 4-14). These memory studies with infants and young children have led developmental psychologists to reevaluate the widely held belief that

Figure 4-14

Young children have surprisingly good memories

Bauer and her colleagues tested young children ranging in age from 21 to 29 months on their memory for events in which they'd participated 8 months earlier, such as setting up an inclined track and letting a car roll down the track, and found that the youngest group did very nearly as well as the oldest. All three groups recalled significantly more of the tasks than control groups who had had no experience with the tasks.

Correctly recalled tasks

■ Experimental group   ■ Control group

Age of children: 21 months, 24 months, 29 months
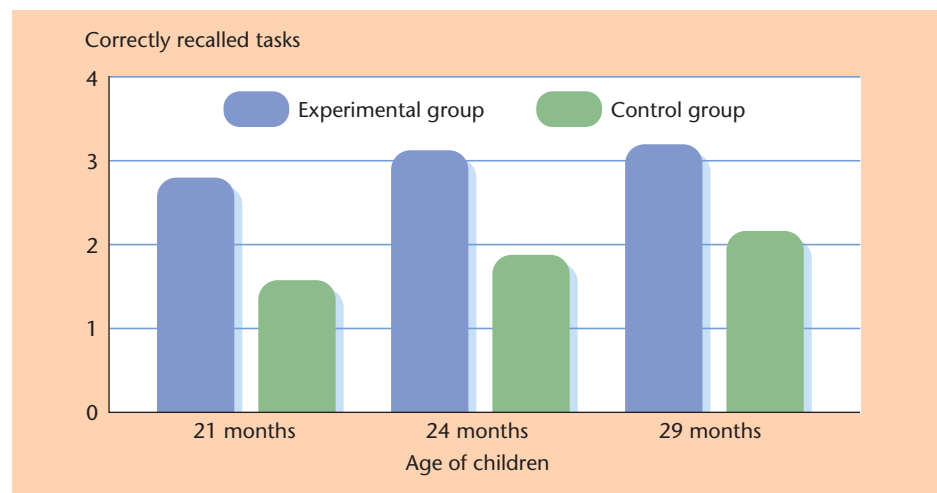
Source: Adapted from Bauer, 1996.

infants and children younger than 3 cannot recall the events of their lives. And recent research in neuroscience is providing new ways of studying and understanding what is developing in the infant brain that supports these early memory abilities (Bauer, 2007). It is increasingly apparent that babies and young children can recall much more of their early lives than we thought possible. In Chapter 9, we will revisit the topic of memory and examine in more detail the kinds of strategies that children develop to help them remember.

SUMMARY

- Babies can see, hear, and respond to interesting sights, sounds, and other sensory stimuli at a much earlier age than was originally believed.

The Newborn

- The newborn, or **neonate**, has a repertoire of **reflexes**, or involuntary responses to external stimuli. Many of these reflexes, some of which have obvious value in helping the newborn survive, disappear during the first year of life.
- Babies experience predictable changes in state, or recurring patterns of alertness and activity level, ranging from vigorous, wakeful activity to quiet, regular sleep. Two significant **infant states** are sleeping and crying.
- Between the ages of 2 and 4 months, babies may fall prey to **sudden infant death syndrome (SIDS)**. Although the causes of SIDS are as yet unexplained, preventive measures for this fatal disorder include the cessation of parental smoking and preventing infants from sleeping on their stomachs.
- The **autostimulation theory** proposes that infants spend more than twice as much time as adults in **REM sleep** because such sleep stimulates higher brain centers that, in turn, promote development of the central nervous system.
- Crying, which is an effective means of early communication, follows distinct patterns that also change with development.
- Although there are wide differences among individuals in soothability, certain caregiver techniques, such as holding the baby to the shoulder or swaddling it, are widely successful in helping to calm a distressed baby. Infants can also help to soothe themselves by sucking on a thumb or pacifier.
- Tests of reflexes may be combined with other assessments to gauge the health, maturity, and capacities of a newborn. The **Brazelton Neonatal Assessment Scale** is one widely used assessment tool.

The Infant's Sensory and Perceptual Capacities

- To study infants' **sensations** and **perceptions**, investigators often make use of the infant's tendency to **habituate** to, or become used to, a given stimulus. Another technique is to use the **visual preference method**, in which researchers pinpoint a baby's preference for looking at one of two alternative stimuli. The violation-of-expectation method, in which investigators assess the infant's behavior following a surprise event, is also commonly used.
- At birth, babies are more sensitive to high-pitched than to low-pitched sounds, and for them to detect a sound, it must be slightly louder than that for a normal adult. Overall, however, a newborn's hearing is very well developed. Newborns can distinguish among different kinds of sounds and tell what direction a sound comes from. They are also very responsive to human voices, which may be significant for later social and language development.
- Although visual capacities continue to develop throughout the first year of life, newborns are sensitive to brightness and can track moving objects. Initially, they have poor **visual acuity** at distances beyond close range, although over the first 3 months acuity improves. Babies gradually begin to distinguish colors and improve in their ability to perceive patterns, including the patterning of human faces.
- The accurate perception of distance improves with age, as babies begin to coordinate their two eyes and use **stereoscopic vision**. Before babies can walk, they can perceive depth, but experiments with the **visual cliff** demonstrate that with locomotion babies begin to show fear of heights. **Shape constancy** is something that even newborns seem to possess. **Size constancy** and visual expectations, however, appear to develop partly through experience.

- Newborns can discriminate among a variety of odors, and by 1 week of age, they have learned to distinguish their mother's smells from those of other people. Newborns are also able to discriminate different tastes, and they display a preference for sweet over sour or bitter.

- The sense of touch is activated long before birth, and newborns are clearly responsive to both positive and negative types of touch; contrary to past beliefs, they are highly sensitive to pain. Infants also quickly learn to discriminate among objects based only on their sense of touch.

- From a very early age, using their capacity for **intermodal perception**, babies can integrate information from two different senses, such as the sounds that go with a certain sight.

Early Learning and Memory

- Newborns can be classically conditioned when a previously neutral stimulus is repeatedly paired with a pleasant stimulus. Eventually, the previously neutral stimulus alone comes to elicit the same reaction. Classical conditioning is more difficult in newborns when an aversive stimulus is involved.

- Newborns can also learn to emit a certain behavior when that behavior is repeatedly rewarded. Successful operant conditioning in newborns typically involves a behavior like sucking, which is important to the baby's survival. This suggests that young babies are best organized to learn conditioned responses that are functionally adaptive.

- Although newborns may be capable of some imitation, the basis of the ability to imitate others and the amount of such behavior the child displays change significantly with age.

- When given adequate retrieval cues for something they have learned, babies can remember information over substantial periods of time.

EXPLORE AND DISCUSS

1. What is the practical value of knowing about the young infant's sensory abilities? How might this information help in the early detection of problems and in the design of useful interventions to help children?

2. Based on your newly gained knowledge of infants' sensory and perceptual capacities, do you think "the amazing newborn" is an appropriate description? Explain your answer.

3. How do you think infants' visual and auditory abilities help them form relationships with their caregivers?

4. What would you tell a friend about the infant's ability to learn and remember new information?

Jacob Lawrence (1917–2000). *The Life of Harriet Tubman*, #4: On a hot summer day about 1820, a group of slave children were tumbling in the sandy soil in the state of Maryland—and among them was one, Harriet Tubman. Dorchester County, Maryland.

1940, Hampton University Museum.

5.

The Child's Growth: Brain, Body, Motor Skills, and Sexual Maturation

Tina's development was rapid from the start. She crawled and walked early, and by her first birthday, her parents had to put breakables on a high shelf, out of her reach. When she was 11 years old, she reached sexual maturity, well ahead of her classmates. Jason, in contrast, grew at a more leisurely pace. Breakable objects were safe in Jason's house until he was 14 months old, and Jason was nearly 16 years old when he experienced his pubescent growth spurt.

The differences between these two children illustrate two common findings. First, the rates at which children grow vary enormously, and second, girls usually develop more rapidly than boys. In this chapter, we examine children's growth and motor development. First, we explore the development of the brain and the way genetic and environmental forces work together to determine brain growth and function. Next, we explore the motor and growth patterns that infants and children follow and the factors that speed up or slow down these patterns. We answer questions such as: Are children growing taller and, if so, why? What are the causes and consequences of being too thin or too fat? What role does nutrition play in growth? Can children who are deprived early of important things such as proper nutrition "catch up" in growth? Finally, we explore puberty, its characteristics, and the factors that influence its course.

BRAIN DEVELOPMENT IN INFANCY

In the prenatal period, as Figure 5-1 dramatically illustrates, the brain grows very rapidly, and it continues to grow at an amazing pace. Although at birth an infant's brain weighs only about one fourth as much as a mature brain, by the time the baby is about 6 months old, its brain weighs half what an adult brain weighs, and the brain of the 2-year-old child weighs three fourths as much as an adult brain (Figure 5-2; Shonkoff & Phillips, 2000).

The largest portion of the human brain consists of the two connected hemispheres that make up the **cerebrum**, a mass of tissue that embodies attributes particular to humans (e.g., speech and self-awareness) and attributes shared with other vertebrate animals (e.g., sensory perception, motor abilities, and memory). The covering layer of the human cerebrum, the **cerebral cortex** (Figure 5-3), is a highly convoluted surface containing about 90% of the brain's cell bodies. Although we do not yet know how these cells control complicated traits, we do know that specific functions, such as seeing, hearing, moving, feeling, thinking, and speaking, can be traced to specific regions of the cerebral cortex.

The Turning Points chart (pp. 144–145) highlights some significant milestones in the development of the brain as well as important steps in the child's motor and physical growth; you may find it useful to refer to this chart as you read through this chapter.

Neurons and Synapses

At birth, a baby's brain has most of its **neurons**, or nerve cells—100 to 200 billion of them (Le Doux, 2002; Nash, 1997). In fact, most neurons are present in the brain by the

cerebrum The two connected hemispheres of the brain.

cerebral cortex The covering layer of the cerebrum that contains the cells that control specific functions such as seeing, hearing, moving, and thinking.

neuron A cell in the body's nervous system, consisting of a cell body, a long projection called an *axon*, and several shorter projections called *dendrites*; neurons send and receive neural impulses, or messages, throughout the brain and nervous system.

Figure 5-1

Fetal brain development

As the brain develops, the front part expands to form the cerebrum, the large, convoluted upper mass that in the adult dominates the upper and side portions of the brain. The cerebrum is covered by the cerebral cortex (see Figure 5-3), specific areas of which are devoted to particular functions such as motor, visual, and auditory activities. (The first five of the drawings in this figure have been enlarged to show details.)

25 days   35 days   40 days   50 days   100 days

5 months   6 months   7 months

8 months   9 months
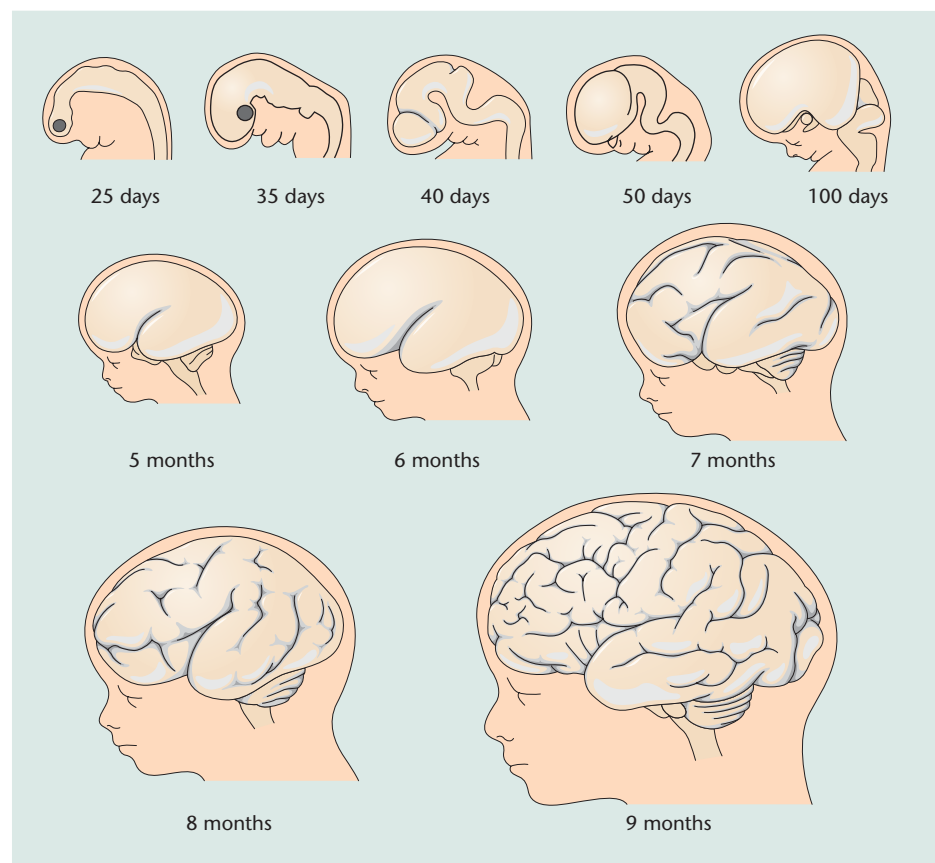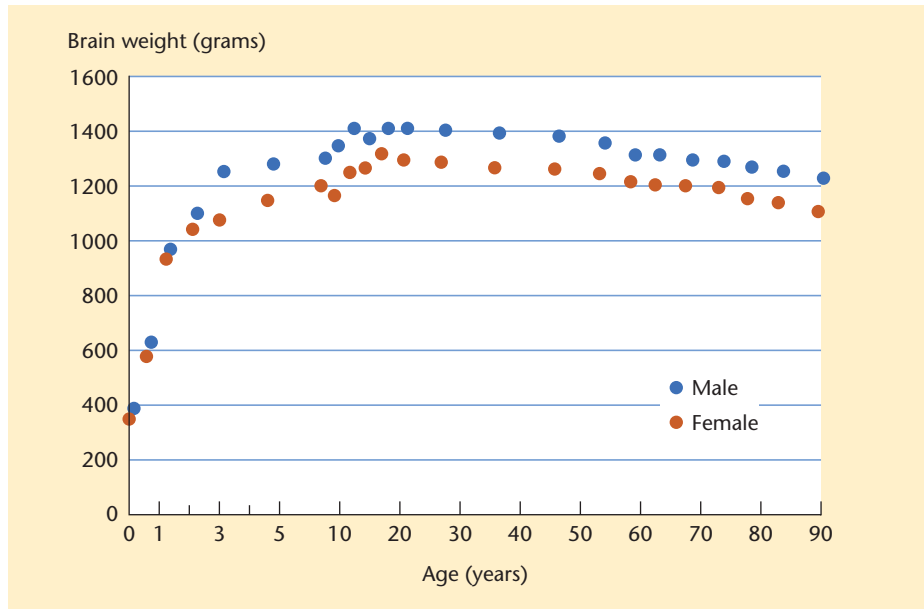
Figure 5-2

How brain weight increases with age

In this figure, the age scale for the early years has been expanded to show this period of rapid growth more clearly. As human beings mature, male brains tend to be heavier than female brains because of men's larger body size. Although scientists are discovering other differences between the brains of women and men, none of these differences have differential effects on either gender's intellectual abilities.

Source: Rosenzweig, Leiman, & Breedlove, 1996.

seventh month of gestation (Rakic, 1995). During the embryonic period, neurons multiply at a very rapid pace in a process called **neuron proliferation**; about 250,000 new neurons are added every minute (Kolb et al., 2003)! Neurologists had assumed that the brain did not grow new neurons after birth, but studies suggest that the adult brain has the capacity to regenerate nerve cells (e.g., Gould et al., 1999; Rosenzweig et al., 1996).

Whether or not it grows new neurons, after birth the brain increases in size. It gets bigger because existing neurons grow, and the connections between them proliferate. **Glial cells**, which surround and protect the neurons, also grow. These cells provide the neurons with structural support, regulate their nutrients, and repair neural tissue. Some glial cells are responsible for the important task of **myelination**, in which parts of neurons are covered with layers of a fatty, membranous wrapping called *myelin* (Figure 5-4). This insulation makes the neuron more efficient in transmitting information (Johnson, 1998). Most myelination occurs during the first 2 years of life, but some continues into adulthood, a reminder that change in the brain is a lifelong process (Sampaio & Truwit, 2001).

neuron proliferation The rapid formation of neurons in the developing organism's brain.

glial cell A nerve cell that supports and protects neurons and serves to encase them in *myelin sheaths.*

myelination The process by which glial cells encase neurons in sheaths of the fatty substance *myelin.*
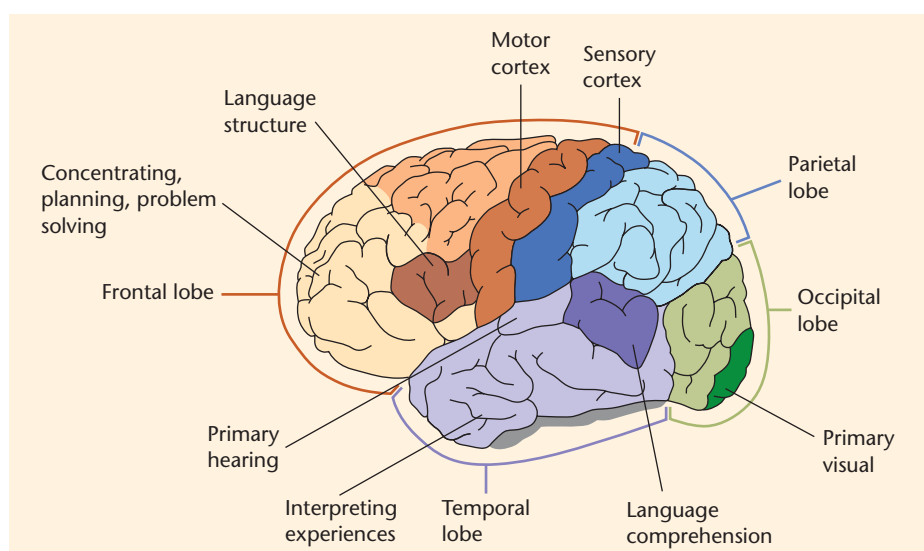
Figure 5-3

The brain's cortex

The cortex is divided into four *lobes*—frontal, temporal, occipital, and parietal—and specific areas within the lobes tend to specialize in particular functions. The left hemisphere, shown here, is generally associated with the processing of language, whereas the right hemisphere plays a greater role in visual and spatial processing. Because of the brain's plasticity, however, functions lost because of damage to one hemisphere, lobe, or area may be compensated for by another brain region.

Source: Postlethwait & Hopson, 1995.

Turning Points

GROWTH OF THE CHILD'S BRAIN, BODY, AND MOTOR SKILLS

AT BIRTH
- Infant's brain weighs one quarter of adult brain weight; has 100 to 200 billion neurons and 2,500 synapses for every neuron. Baby generally assumes fetal position.

EARLY INFANCY
- Baby shows some evidence of hemispheric specialization. Most infants show right-hand dominance. When baby is held with feet touching flat surface, she makes stepping motions that resemble walking; this response disappears at about 2 months.

ABOUT 2 MONTHS
- Motor cortex of infant's brain begins to control voluntary movement. Baby lifts head and shoulders off mattress.

3 MONTHS
- Within first 3 months, baby doubles his weight.

3–4 MONTHS
- Baby looks at and swipes at objects, retains toys put into her hand, but makes no contact with objects on a table. She holds head up for extended time, plays with her fingers, and kicks actively.

4 MONTHS
- Baby sustains head control and rolls from his tummy onto his back; sits with support.

4–5 MONTHS
- Baby contacts toys on table; grasps block precariously.
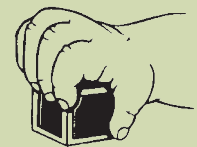
5 MONTHS
- Baby sits on adult's lap and grasps object; rolls from back to tummy, makes incipient crawling movements.

5–6 MONTHS
- There may be some indication of an inherited tendency to overweight.

6–7 MONTHS
- Baby bangs, shakes, and transfers toys from hand to hand; uses palmar grasp with a block; tries to grasp a raisin with whole hand.

7 MONTHS
- Baby sits alone.

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental changes. Milestones in sexual maturation are covered in Table 5-3.

Sources: Adolph & Berger, 2006; Bertenthal & Clifton, 1998; Kopp, 1994; Shirley, 1931.

ABOUT 8 MONTHS	• Baby uses finger grasp with block and scissors grasp with raisin. Begins creeping; pulls up into unsteady stand but can't get back down; overall body control is better, with fewer unintended movements.
ABOUT 8 OR 9 MONTHS	• The brain's hippocampus, which aids in memory processes, becomes fully functional.
ABOUT 9 MONTHS	• Baby holds one block in each hand; approaches a raisin with index finger. Easily moves between sitting and lying; sitting is balanced and steady; stands holding furniture.
10 MONTHS	• Baby begins cruising (creeping); stands on toes while holding on but stands alone unsteadily; begins to use some implements, such as spoons.
11 MONTHS	• Baby is obsessed with learning to walk—walks when led; cruises until exhausted; feeds self with thumb and forefinger.
11–12 MONTHS	• Uses forefinger grasp with block and pincer grasp with raisin.
12–15 MONTHS	• Child's brain has about half again as many synapses as adult brain; synaptic pruning gradually reduces this number. Child stands alone and walks without assistance.
18 MONTHS	• Child runs and gallops.
2 YEARS	• In most children, right-handedness is fully established.
3 YEARS	• 90% of children show left-hemisphere bias for language. Children can hop.
4 YEARS	• Children who will be obese later in life begin to gain weight at a faster rate than other children.
9 YEARS	• Boys catch up with girls in height but then slow down again until about 14.
10 YEARS	• Some young girls succumb to anorexia or bulimia between 10 and the early 20s.
14 YEARS	• Girls' height gain slows down considerably while boys' gain takes off; boys' weight gain also shoots up.
16–17 YEARS	• Most young people have attained their full height.
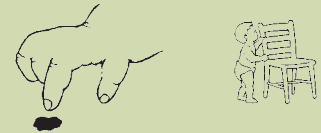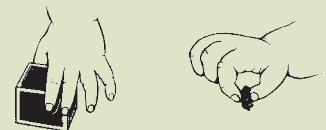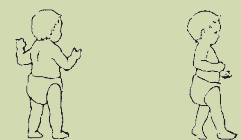
Figure 5-4

A myelinated neuron

The neuron's axon terminates in synaptic knobs that, in synaptic connection with the dendrites of another neuron (see Figure 5-5) or with other types of cells, transmit messages through the nervous system. The myelin sheaths that encase much of the axon facilitate the transmission of signals rapidly and efficiently. Neurons are the longest cells in the human body, sometimes reaching more than 3 feet in length.
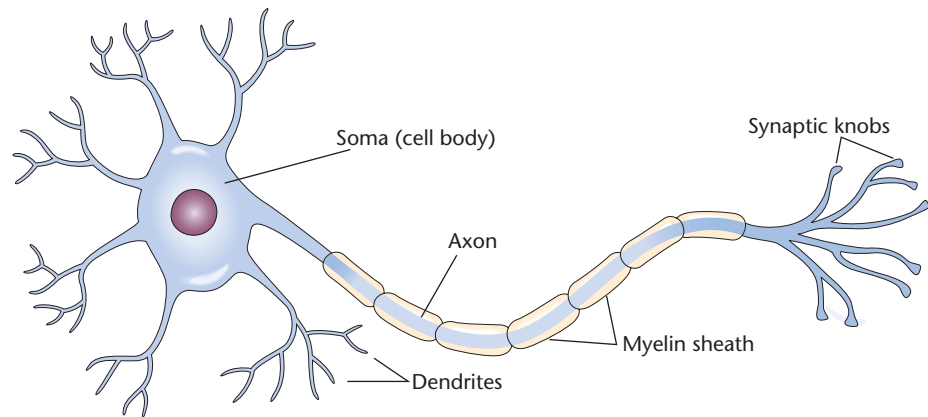
Source: From *Fundamentals of Anatomy & Physiology*, 3rd ed. by Frederic H. Martini, Fig. 12-7b, p. 389. Copyright © 1995 by Prentice Hall, Inc. Reprinted by permission of Pearson Education, Inc., Glenview, IL.

neural migration The movement of neurons within the brain that ensures that all brain areas have a sufficient number of neural connections.

synapse A specialized site of intercellular communication where information is exchanged between nerve cells, usually by means of a chemical *neurotransmitter.*

synaptogenesis The forming of synapses.

neuronal death The death of some neurons that surround newly formed synaptic connections among other neurons; also called *programmed cell death.*

synaptic pruning The brain's disposal of the axons and dendrites of a neuron that is not often stimulated.

Neurons are "always on the move" (Rosenzweig et al., 1996, p. 105) as they migrate to their final locations in the brain. Guided by neurochemical processes, this **neural migration** ensures that all parts of the brain are served by a sufficient number of neurons. The absence of sufficient neurons in their proper locations is associated with various forms of mental disability and with disorders such as dyslexia and schizophrenia (Johnson, 1998, 2005; Kolb et al., 2003).

Perhaps as essential as neurons themselves are the connections between neurons, known as **synapses**. At these specialized junctions, the extended *axon* of one neuron transmits a message to the projected *dendrites* of another neuron, usually by means of chemicals that cross the small space between the neurons (Figure 5-5). This activity is crucial to survival and learning, for as the brain's neurons receive input from the environment, they create new synapses, allowing for increasingly complex communications. **Synaptogenesis**, or the forming of synapses, begins early in prenatal life, as soon as neurons appear. The brain forms many more synapses than neurons; for example, at birth, in the brain's visual cortex, there are 2,500 synapses for every neuron; when the child is about 2 years old, there are about 15,000 synapses for every neuron (Huttenlocher, 1994; Huttenlocher & Dabholkar, 1997).

Are all these neurons and synapses necessary? Do they continue to function throughout life? The answer to both questions is no. The brain is programmed to create more neurons and connections than are needed. With development, two processes reduce the number of neurons and connecting fibers (Sowell et al., 2003). When new synapses are formed, some surrounding neurons die in what is called **neuronal death**, or *programmed cell death* (Kandel et al., 2000), apparently to provide more space for these crucial loci of information transmission. In **synaptic pruning**, the brain disposes of a neuron's axons and dendrites if that particular neuron is not often stimulated (Abitz et al., 2007) (see Figure 5-6). This frees up space for new synaptic connections. The goals of both neuronal death and synaptic pruning are to increase the speed, efficiency, and complexity of transmissions between neurons and to allow room for new connections that develop as the child encounters new experiences (Huttenlocher, 1994; Kolb et al., 2003). Brain development is not simply an additive process but one that increases in efficiency and specialization. Loss in this case leads to a gain for the developing organism.

By adulthood, each of the brain's approximately 1 trillion neurons makes 100 to 1,000 connections with other neurons. That adds up to about 1 quadrillion synapses in the adult human brain (Huttenlocher & Dabholkar, 1997).

Sequential Development of the Brain

There is an orderly sequence to brain development during infancy. As the baby moves from mostly reflexive behavior in the early months of life to voluntary control over
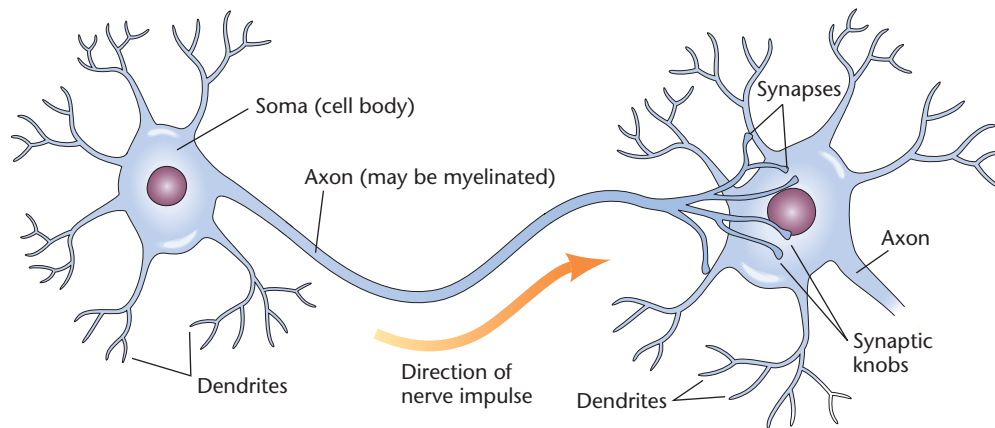
Figure 5-5

Synaptic connection between two neurons

Across the small space between one neuron's synaptic knobs and another's dendrites or soma a chemical substance effects the transfer of information.

Source: From *Fundamentals of Anatomy & Physiology*, 3rd ed. by Frederic H. Martini, Fig. 12-7d, p. 389. Copyright © 1995 by Prentice Hall, Inc. Reprinted by permission of Pearson Education, Inc., Glenview, IL.

movements, the motor area of the brain develops most rapidly. When the infant is about 2 months old, motor reflexes such as rooting and the startle response (see Chapter 4) drop out, and the motor cortex begins to oversee voluntary movements such as reaching, crawling, and walking. As we have already noted, in the visual cortex, the number of synapses per neuron is multiplied six times within the first 2 years of life. As a result, infants' visual capacities are greatly enhanced; for example, they become more skilled at focusing on objects at different distances (Nelson, 1999a; Nelson et al., 2006). A similar sequence of synaptic and behavioral developments characterizes the evolution of the auditory cortex and other areas of the brain (Nelson, 1999b; Nelson et al., 2006).

Hemispheric Specialization

One of the most important organizing features of the brain is its division into two halves, or **hemispheres**. The left and right hemispheres, which are connected by a set of nerve

brain hemispheres The two halves of the brain's cerebrum, left and right.
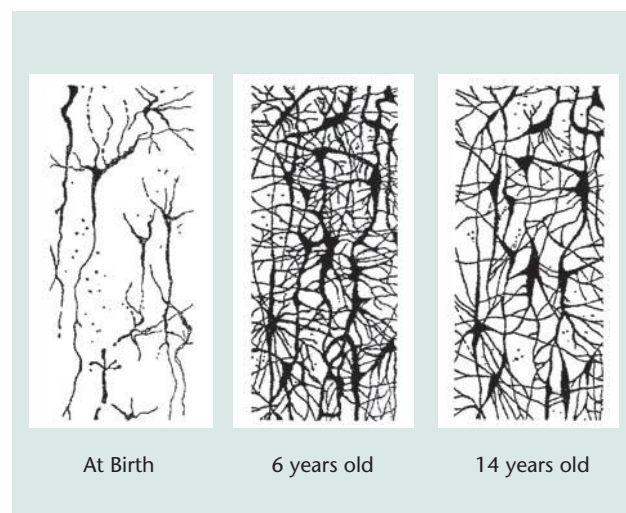
Figure 5-6

Developmental changes in neurons of the cerebral cortex

During childhood, the brain overproduces neural connections, establishes the usefulness of certain ones of these, and then "fine-tunes" the extra connections. Especially in the frontal cortex, overproduction of synapses may be essential for infants to develop certain intellectual abilities. According to some scientists, the connections that are used survive, and those that are not die.

Source: Reprinted by permission of the publisher from *The Postnatal Development of the Human Cerebral Cortex*, Vols. I–VIII by Jesse LeRoy Conel, Cambridge, Mass.: Harvard University Press. Copyright © 1939, 1975 by the President and Fellows of Harvard College.

At Birth   6 years old   14 years old

corpus callosum The band of nerve fibers that connects the two hemispheres of the brain.

fibers called the **corpus callosum**, are anatomically different and, in general, control different functions (Kandel et al., 2000). However, because a great deal of cross-wiring occurs between the hemispheres, the separation is by no means complete. Not only do both hemispheres play some role in most functions, but when one side of the brain suffers damage, the other half may take over some functions.
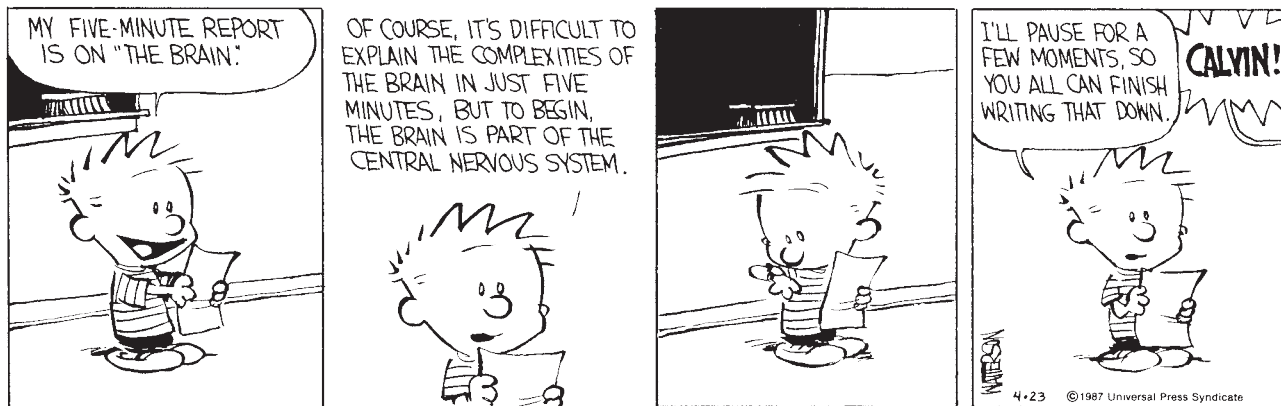
hemispheric specialization Differential functioning of the two cerebral hemispheres; the left controlling the right side of the body, the right controlling the left side.

lateralization The process by which each half of the brain becomes specialized for certain functions—for example, the control of speech and language by the left hemisphere and of visual-spatial processing by the right.

LEFT- AND RIGHT-BRAIN FUNCTIONS   Hemispheric specialization

begins early in life (Stephan et al., 2003). The left hemisphere of the motor cortex controls simple movement in the right side of the body, and the right hemisphere controls the body's left side. **Lateralization** describes the specialization of each hemisphere in specific perceptual and cognitive tasks.

The right hemisphere processes visual-spatial information, nonspeech sounds like music, and the perception of faces (Nelson & Bosquet, 2000; Nelson et al., 2006). When damage occurs to the right side of the brain, people may have difficulty attending to a task requiring visual-spatial perception, their drawing skills may deteriorate, they may have trouble following a map or recognizing friends, and they may become spatially disoriented (Carter, Freeman, & Stanton, 1995). The right hemisphere is also involved in processing emotional information, as shown by the fact that people with right-brain damage can have difficulty interpreting facial expressions (Dawson, 1994; Nelson et al., 2006). At the same time, right-hemisphere damage can sometimes make people indifferent to or even cheerful about things that would normally upset them. This is because the left hemisphere is activated in the expression of emotions associated with approaching the external environment, such as joy, interest, and anger, whereas the right hemisphere is activated in emotional expression that causes the person to turn away or withdraw from that environment, such as distress, disgust, and fear (see Figure 5-7, as well as Davidson, 1994; Fox, 1991).

The left hemisphere of the brain is associated with language processing; although people with left-hemisphere damage can recognize a familiar song and tell a stranger's face from an old friend's, they may have trouble understanding what is being said to them or speaking clearly (Springer & Deutsch, 1993). Evidence of the genetic basis of lateralization is seen in the positive association of the degree of language lateralization between parents and children (Anneken et al., 2004). Interestingly, however, in persons who are deaf and use sign language to communicate—a language that involves motor movements of the hands—the right side of the brain can take over language functions (Neville & Bruer, 2001; Sanders et al., 2007).

These and other findings demonstrate that the brain is capable of adapting to external change. If brain injury occurs in the early years of life, because the young brain is not fully developed and hemispheric specialization is not yet complete, infants and young
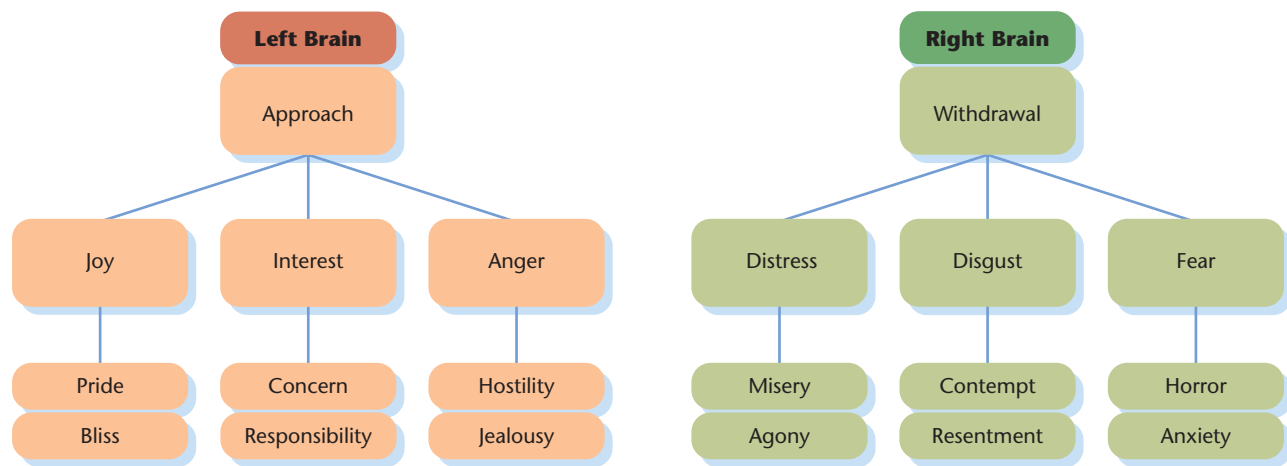
Figure 5-7

Emotions associated with left- and right-brain hemisphere activity

According to a recent theory, both hemispheres are involved in emotional expression, but the left focuses on feelings that trigger an approach to the environment and the right on feelings that cause a person to turn away from the environment.

Source: Dawson, 1994.

children often recover their functioning (Fox et al., 1994; Stiles, 2000). For instance, when the left hemisphere is damaged in early infancy, a child can still develop language ability close to normal (Bates & Roe, 2001). Even in adults, there is still a great deal of modifiability, and lost function can often be partially recovered through treatment (Black et al., 1998; Briones et al., 2004).

CONSEQUENCES OF BRAIN LATERALIZATION The degree to which a newborn's brain is lateralized in processing speech sounds—that is, is prone to use one hemisphere rather than the other—has consequences for the child's language ability 3 years later (Hoff, 2005; Molfese & Molfese, 1985). Infants whose left hemisphere differentiates among speech sounds and whose right hemisphere differentiates

As this teacher of the hearing impaired demonstrates "I love you" in American Sign Language to her eighth-grade student, it may be the right hemisphere of her brain that is particularly activated. As the text describes, there is evidence that in deaf and hearing-impaired people, the right hemisphere takes over language functions.

among nonspeech sounds exhibit better language skills at age 3. However, infants' brain responses to hearing speech and matching it with concrete objects are multidimensional and involve a variety of processes, some of which are lateralized and some of which are not (Molfese et al., 1990). Clearly, brain functioning between the hemispheres is highly complex and requires continued study.

dyslexia A term for the difficulties some people experience in reading or in learning to read.

One reason we need to know more about it is that theories about lateralization underlie current explanations of **dyslexia**—the difficulties some children (and adults) experience in learning to read. As many as 5% of U.S. children experience such problems. Typically, they have difficulty integrating visual and auditory information—for example, matching written letters or words to the sounds of those letters and words. Some children confuse letters, for example, calling a *d* a *b*; others have difficulty breaking apart the letters and syllables of a word (Liberman et al., 1976; Veuillet et al., 2007). Some researchers have suggested that children with dyslexia do not show the normal lateralization pattern; that is, they process spatial information on both sides of the brain rather than primarily on the right, and thus, their left hemispheres may become overloaded, leading to deficits in language skills such as reading (Baringa, 1996; Witelson, 1983). The view that reading difficulties are caused by faulty lateralization patterns continues to receive support (Banish, 1998; Bryden, 1988; Veuillet et al., 2007).

Handedness is another function that is lateralized. About 90% of adults are right-handed and a majority of young infants show right-hand dominance (Dean & Anderson, 1997; Maurer & Maurer, 1988); even 90% of fetuses prefer to suck their right thumbs, which suggests that handedness develops in the womb (Hepper, 2004). Recently, a gene for left handedness has been identified (Francks, 2007), a finding consistent with the genetic basis of handedness. An illustration of the genetics of handedness comes from the British Royal family, which has a large number of lefthanders, including Princes Charles and William. However, some left-handed people are ambidextrous, able to use both hands for some tasks. This suggests that their brains may be less clearly lateralized than the brains of right-handed people (Coren, 1992).

The Brain's Plasticity: Experience and Brain Development

plasticity The capacity of the brain, particularly in its developmental stages, to respond and adapt to input from the external environment.

The brain continues to develop so rapidly after birth that it is clear that stimulation from the environment plays a role in brain development. The human brain's **plasticity**, or the responsiveness of its neural structures and functions to input from the environment, is one of its most remarkable features.

experience-expectant processes Brain processes that are universal, experienced by all human beings across evolution

Two types of experience influence brain development (Greenough & Black, 1999). **Experience-expectant processes** are those experiences such as touch, patterned visual input, sounds of language, affectionate expressions from caregivers, and nutrition, which are all expected in normal environments. They trigger synaptic development and pruning and are critical for normal brain development. When there is interference with this normal stimulation, basic abilities are impaired. For example, when children have congenital cataracts, their visual system is deprived of stimulation and fails to develop properly so that, even when the cataracts are removed, the adult is blind.

experience-dependent processes Brain processes that are unique to the individual and responsive to particular cultural, community, and family experiences.

The second kind of experience that influences brain development is called **experience-dependent processes**. These experiences are unique to individuals—experiences encountered in particular families, communities, and cultures. Brains respond to different environments by developing synaptic connections that encode specific and unique experiences. For example, children in Mozambique develop aspects of the motor cortex that correspond to the skills associated with hunting and fishing, whereas American children develop parts of the brain that reflect the fine motor and eye-hand coordination needed for success at video games.

Animal research shows that the size, structure, and even the biochemistry of the brain can be modified by experience. Rosenzweig and his colleagues (Benloucif et al., 1995; Rosenzweig, 2003) placed young rats in two very different environments. The "enriched" environment consisted of large, brightly lit, communal cages with wheels, ladders, platforms, and other toys that were changed daily to ensure that the rats had a steady stream of new learning experiences. In the "impoverished" environment, each rat was alone in a bare, isolated cage located in a quiet, dimly lit room. When the researchers compared the brains of the young rats after nearly 3 months, they discovered that the weight of the cerebral cortex, which controls higher order processes, was about 4% heavier for rats in the enriched environment, and the weight of the occipital region, which controls vision, was 6% heavier.

One reason the enriched rats had bigger brains was that enriched environments tend to increase the complexity of neurons as measured by the number of dendrites (Black et al., 1998; Jones & Greenough, 1996). A greater number of dendrites means that more synapses formed with other neurons, which in turn means that more information can be sent via these synaptic connections. At the same time, the activity of key chemicals in the brain, especially in the cerebral cortex, increases significantly as a result of enriched rearing environments.

It may not be only the young who can benefit from enriched experiences. Adult rats exposed to impoverished or enriched environments after being reared in normal laboratory conditions show changes like those in young rats (Black & Greenough, 1998; Brione et al., 2004). Still, the effects of differential experience tend to be greater during the earlier periods of life.

Research on human infants also demonstrates the brain's plasticity. For example, although newborns respond to the sounds of all languages, over the first year of life infants become more selective, responding increasingly to sounds they hear in their own language (Kuhl, 2004; Kuhl et al., 1997). Apparently, different sets of neuronal connections become programmed to respond to particular aspects of speech so that infants' brains develop "auditory maps," or templates that respond to certain auditory features and not others. These maps then guide them in recognizing their native language.

Exposure to music can also enrich children's brain development. The natural harmonies of music may help the brain develop a wiring diagram that promotes spatial-temporal reasoning. In one study, after 6 months of weekly piano lessons, 3- and 4-year-olds improved markedly in this kind of reasoning as demonstrated by their ability to look at a disassembled picture of an elephant and to tell the researcher how to put the pieces together (Sarnthein et al., 1997). In contrast, children who received computer training or no stimulation showed little improvement. In another study, cellists were found to have expanded development of the part of the motor cortex that is associated with the type of hand-eye coordination needed to be a successful cello player (Munte et al., 2002). The brain is indeed plastic and responsive to the unique environments individuals create through their choice of activities.

Lack of stimulation or exposure to traumatic events, in contrast, can damage the brain and cause it to malfunction. In abused children, both the cortex and the *limbic system*—centers in the brain that are involved with emotions and infant-parent attachment—are 20% to 30% smaller and have fewer synapses than in nonabused children (Perry, 1997). Techniques for studying brain function and activity such as *positron-emission tomography*, or PET (see Table 5-1), also show the effects on the developing brain of early deprivation—for example, the unstimulating and unresponsive environment of a Romanian orphanage (Nelson, 2007; see Figure 5-8). These studies show that under such circumstances there is reduced connectivity or communication between regions of the brain (Eluvathingal et al., 2006) as well as reduced cortical activity involving neurons acting together to solve a cognitive task such as memory or face processing (Parker et al., 2005). These naturalistic experiments illustrate the malleability of the developing brain and its responsiveness to environmental conditions.

Table 5-1   Techniques for studying human brain function and structure

Technique	What It Shows	Advantages (+) and Disadvantages (−)
EEG (electroencephalograph): Multiple electrodes are pasted to the outside of the head.	Lines that chart the summated electrical fields resulting from the activity of billions of neurons	+ Detects very rapid changes in electrical activity, allowing analysis of stages of cognitive processing − Provides poor spatial resolution of the source of electrical activity. EEG is sometimes combined with magnetoencephalography (MEG), which localizes electrical activity by measuring magnetic fields associated with it
PET (positron-emission tomography) and SPECT (single-photon emission computed tomography): Positrons and photons are emissions from radioactive substances.	An image of the amount and localization of any molecule that can be injected in radioactive form, such as neurotransmitters, drugs, or tracers for blood flow or glucose use (images indicate specific changes in neuronal activity)	+ Allows functional and biochemical studies + Provides visual image corresponding to anatomy − Requires exposure to low levels of radioactivity − Provides spatial resolution better than that of EEG but poorer than that of MRI − Cannot follow rapid changes (faster than 30 seconds)
MRI (magnetic resonance imaging): Exposes the brain to a magnetic field and measures radio frequency waves.	Traditional MRI provides high-resolution image of brain anatomy. Functional MRI (fMRI) provides images of changes in blood flow (which indicate specific changes in neural activity). A new variant, diffusion tensor imaging (DTI), shows water flow in neural fibers, thus revealing the "wiring diagram" of neural connections in the brain.	+ Requires no exposure to radioactivity + Provides high spatial resolution of anatomical details (under 1 mm) + Provides high temporal resolution (slower than $\frac{1}{10}$ second)
TMS (transcranial magnetic stimulation): Temporarily disrupts electrical activity of a small region of brain by exposing it to an intense magnetic field.	Normal function of a particular brain region can be studied by observing changes after TMS is applied to a specific location.	+ Shows which brain regions are necessary for given tasks − Long-term safety not well established

Source: Bernstein et al., 2008.

MOTOR DEVELOPMENT

In this section, we discuss the course of motor development—the development of hand skills, as infants reach and grasp and pick up objects, and locomotion skills, as infants learn to crawl and then to walk.

Hand Skills

Reaching out and grasping an object are some of the greatest achievements in the first 2 years of life (Adolph & Berger, 2006). Even newborns display a grasping reflex and a rudimentary form of reaching—called "prereaching"—that involves uncoordinated "swipes" at objects. At about 3 months of age, infants initiate a more complex and
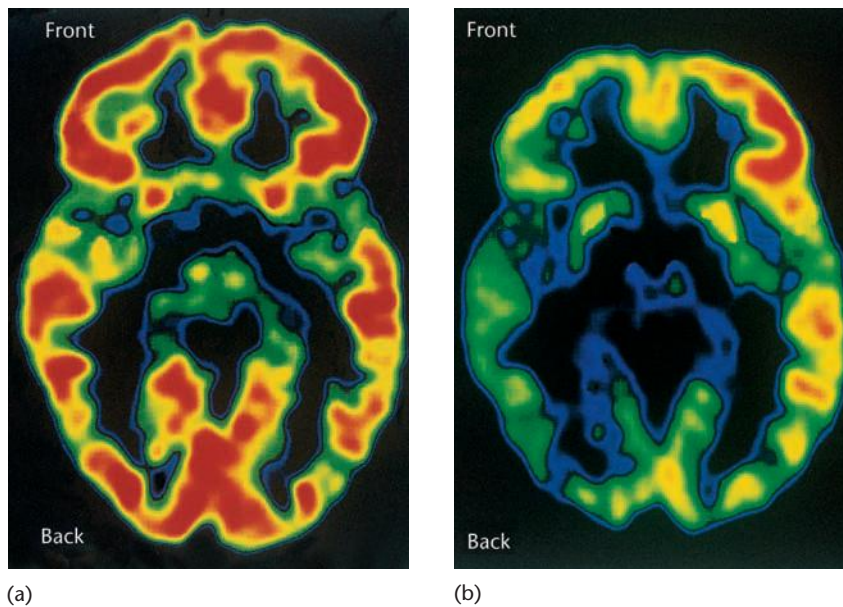
Figure 5-8

How early deprivation can affect brain activity

In the brain of a normal child (a), positron-emission tomography (PET) reveals many regions of high activity (red), whereas in the brain of an institutionalized Romanian orphan who suffered extreme deprivation from birth (b), there are many fewer such regions and more areas of less activity. The degrees of brain activity, from highest to lowest, follow the color sequence red, yellow, green, blue, and black.

Source: Begley, 1997.

(a)   (b)

efficient pattern of reaching—namely, *directed reaching* (Spencer & Thelen, 2000; Thelen et al., 1993). By the time they are about 5 months old, they generally succeed in reaching for an object and successfully grasping it. To achieve this milestone involves muscle growth, postural control, control over the movement of arms and hands, and a variety of perceptual and motor abilities. Only when all parts of the system are ready to work together can infants become competent in reaching and grasping objects (Adolph, 2005; Thelen & Smith, 2006). This "putting the pieces" together view of how reaching develops is consistent with the dynamic systems view of development that we reviewed in Chapter 1.

One component of the dynamic system is visual perception. If the infant has nothing to look at, there is no incentive to reach out. In experiments with institutionalized infants whose normal environments were severely restricted, researchers showed that enriching infants' visual world by hanging colorful toys over their cribs, providing them with multicolored sheets and bumper pads, and ensuring that they were handled more often by caregivers could advance their abilities to attend to objects and to reach for them (White, 1967).

Another component involves the motor ability to grip an object. The frequency and skill with which infants employ various grips improve with age (Adolph & Berger, 2006; Siddiqui, 1995). Grips also depend on the size and shape of the object. Infants vary their grip according to the size and shape of an object and the size of their own hands relative to the object's size (Newell et al., 1989). They use a grip involving the thumb and index finger for small objects, but for large objects, they use either all the fingers of one hand or both hands. Four-month-olds rely on touch to determine their grip; 8-month-olds use vision as a guide so they can preshape their hand as they reach for an object.

Over the first year of life, infants' progress in controlling their hands is remarkable. They not only become skilled reachers and graspers but they also begin to use objects as tools—for example, a spoon (McCarty et al., 2001). Although at first they often use the object incorrectly (grabbing a spoon by the bowl instead of the handle), by 18 months, they know which end to grab and how to use a

Using a finger grasp to pull a puzzle piece out of its place with one hand and with the other to hold a second piece in waiting shows some advanced skill on the part of this 7-month-old baby. On average, infants are 8 months old before they can use this type of grasp.

spoon to feed themselves. Moreover, they learn to use hand and finger gestures in social communication—for example, pointing and using their hands to show objects to others (Franco & Butterworth, 1996; Goldin-Meadow, 2006). By age 2, they use their hands skillfully in play (e.g., building a tower of blocks), and by age 3, they use their hands to scribble with crayons or copy vertical lines on a page.

Locomotion

The development of locomotion involves three phases or transitions (Thelen & Smith, 1994, 2006). The first of these has long puzzled researchers: When you hold a young baby upright and let its feet touch a flat surface, tilting the baby's body slightly from side to side, the baby responds by reflexively moving the legs in a rhythmic stepping motion that resembles walking. But this stepping reflex disappears by the time the infant is about 2 months old. Not until the second half of the baby's first year does the second transition occur, with the reappearance of stepping movements. In the third transition, at about 1 year of age, infants begin to walk without support.

Various theories of how walking develops have been offered. Maturational theorists have suggested that walking depends on the development of the motor cortex (McGraw, 1940). Cognitive theorists have suggested that it is a response to cognitive plans or representations that are the consequence of watching other people walk (Zelazo, 1983). The most satisfactory explanation, however, is based on Thelen's dynamic systems theory (Thelen, 1995; Thelen & Smith, 2006), which suggests that walking skills are determined by the interplay of emotional, perceptual, attentional, motivational, postural, and anatomical factors. Just as we saw for reaching and grasping, all these components must be "ready," and the developmental context (in this case, the weight of the baby's body in proportion to the strength of the legs) must be right before the infant can walk. According to this theory, the newborn's stepping response disappears for a 10-month interval before true walking emerges because of anatomical factors; that is, the baby's size and

Taking your first steps must be an emotional experience; the joy and excitement on the faces of both the 11-month-old baby and the child's 7-year-old sister are contagious. Perhaps these positive emotions are also contributing to the baby's slightly advanced ability; on average, children walk alone at about 12 months.

weight become too much of a load on the emerging motor system, masking the child's stepping capability (Thelen, 1995). If this explanation is correct, infants between the ages of 2 months and 12 months should be able to step as long as they're given the stability and postural support necessary to stretch each leg forward and back while in an upright position. Thelen (1995; Thelen & Smith, 2006) provided such support by holding infants on a motorized treadmill. Immediately, they performed alternating stepping movements that were remarkably similar to more mature walking.

Upright walking is only the beginning, of course, and by the time children are about 7 years old, they have acquired the more complex skills of running, galloping, and hopping (Adolph & Berger, 2006; Cratty, 1999). Running is well established by the time the child is a year and a half old (Forrester et al., 1993), and galloping emerges at about the same time (Whitall & Clark, 1994). Hopping, which requires balance and strength, emerges between 2 and 3 years (Halverson & Williams, 1985). As with walking, a dynamic systems approach provides the best explanation of this developmental progression: These skills depend on improvements in balance and coordination and on the opportunity for practice (Adolph & Berger, 2006; Bertenthal & Clifton, 1998).

How Locomotion Affects Other Aspects of Development

One important consequence of locomotor development is increased independence. Babies who can crawl or walk can explore their environments more fully and initiate more contact with other people. This newfound independence, in turn, changes the way people respond to the child. No longer can parents place their infants on a blanket in the middle of the floor, expecting that they will be there when they turn around. Infants can now move at will, leaving behind them a trail of mayhem—torn magazines, overturned coffee cups, broken glass. To prevent this chaos, parents must intervene with distractions or prohibitions. Researchers have observed that early walking is related to increased parent-child interaction and more "testing of the wills" between mothers and children (Biringen et al., 1995).

The onset of locomotion also affects the way babies react to the world (Adolph & Berger, 2006). After they begin crawling, infants develop a fear of heights (Bertenthal et al., 1994; Campos & Bertenthal, 1989), perhaps partly because they are now able to solve spatial problems. In one study, researchers compared precrawling infants, belly-crawling infants, and babies who crawled on hands and knees. All the babies watched while a toy was hidden in one of two containers. Then the researchers rotated each infant 180 degrees and left him or her to find the toy. Good crawlers were more likely to solve the problem than noncrawlers or belly crawlers, suggesting that locomotion helps infants deal with changes in spatial orientation. Motor development and perception are apparently interdependent parts of the child's "action system" for moving in the environment. In children at risk because of some developmental disability, the action system may be in jeopardy (see Box 5-1).

The Role of Experience and Culture

Although overall limits to motor development are set by physical maturation, within these limits the timing of various skills is affected by environmental factors (Bradley et al., 2001). Cross-cultural studies have provided us with information about how specific ways of caring for infants can alter their motor development. In general, it seems that when parents or other caregivers pay special physical attention to babies, including manipulation, massage, exercise, and specific practice of skills, the infants achieve motor milestones somewhat earlier than children not given such care and opportunities. For example, in Zambia, mothers carry their new babies with them everywhere in

BOX 5-1

Risk and Resilience

BLIND INFANTS STRUGGLE TO "SEE"

Being unable to see puts an infant at risk for many difficulties. As Figure 5-9 shows, blindness retards motor development considerably, especially the baby's first efforts to raise his body with his arms and his attempts to stand up by holding on to furniture, to walk alone, and to reach for objects (Adelson & Fraiberg, 1974). This limited mobility can have serious consequences: "It lessens [the blind infant's] ability to explore independently, to discover by himself the objective rules that govern things and events in the external world" (Fraiberg, 1977, p. 270). As we will see, studying the motor development of blind infants not only helps researchers devise ways to help these at-risk children but also gives us more information about the interdependence among various sensory and motor systems.

No matter how resilient a blind infant may be, he or she clearly needs help learning about and functioning in the physical and social environment. On the assumption that blind infants need assistance learning to associate sound with the information they get from touch, Fraiberg (1977) developed a program that maximizes babies' opportunities to make sound a guide for touch. Parents of blind infants were encouraged to talk to their babies both as they were physically approaching them and during routine activities such as feeding and dressing. Fraiberg's program also called for parents to provide their infants with toys that make sounds and to make sure that these toys were within their infants' easy reach so as to encourage both coordinated two-hand activity and the explo-

ration of objects that make sounds. With the help of these interventions, infants learn to use a combination of sound and touch as a way of identifying people and things. And it does make a difference. In comparison with blind children who do not receive such extra stimulation, stimulated blind babies are less delayed in standing and walking, even though they are still behind sighted infants in motor development.

Technology can also play a role in building motor capabilities for blind infants. Experimenters in Scotland suggested that an electronic device that produces echoes from nearby objects might help blind babies to "see." The blind infant might learn to use this feedback to judge her distance from an object and even perhaps to assess the object's size and texture. Bower (1979, 1989) had blind infants wear an echo-producing device for several months and found that by using the echo feedback, the babies could judge their distance from objects and even sometimes an object's size and texture. The infants' reaching ability improved, and they were able to do things more typical of sighted infants.

Because much research in this area has focused on devices that must be carried and manipulated by the user, the so-called electronic travel aids (ETAs) that have been developed are designed for blind adults. Adults have found ETAs, which use laser or sound-wave technologies, particularly useful in enabling them to avoid contact with other pedestrians and to detect the presence of nearby objects (Blasch et al., 1989). Two of the newer sensor devices, which provide information

a sling on their backs; then, when they are able to sit, the mothers leave their infants sitting alone for considerable periods of time, giving them plenty of opportunity to practice motor skills. Zambian babies show early development of motor skills (Hopkins & Westra, 1988). Jamaican mothers regularly massage their infants, stretch their arms and legs, and give them practice in stepping, and their children, too, are motorically advanced (Hopkins & Westra, 1990). In contrast, among the Zinacantecos of Mexico, infants are tightly swaddled for the first 3 months of life; they have less advanced motor skills (Greenfield & Childs, 1991). In Chinese families living in small, cramped apartments with uncarpeted floors, parents put their infants on soft featherbeds and pillows to prevent them from hurting themselves, and the babies' crawling is restricted by the lack of room to roam (Campos et al., 2000). Some of these infants fail to develop adequate strength in muscle groups critical for crawling, and their crawling is delayed.

Among infants in the United States, practice in motor behavior can hasten walking and other motor skills. Zelazo and colleagues (1972) asked mothers of newborns to

Figure 5-9

Motor development in blind and sighted babies

Clearly, being sighted helps an infant to develop motorically, but in some movements, such as rolling over and sitting up, blind babies are not very far behind sighted infants. The squares and circles indicate the average ages at which particular activities emerge in blind and sighted babies; the extent of each line indicates the age range within which babies may begin specific activities.

to the user in synthesized speech, require that places frequented by the public, such as hotels and public buildings, install special transmitters whose signals can be picked up by the device (Bentzen & Mitchell, 1995). Thus, for example, a transmitter in a hotel lobby might, when activated by a scanning sensor, inform the person that "Elevators are to your right." For the preverbal child, perhaps scaled-down versions of ETAs might be developed, and it's not beyond imagining that, for the child who has acquired good language skills, "talking sign" devices might be adapted to home and school use.

give their infants practice in the stepping reflex a few minutes a day. Not only did these babies make more walking responses at 2 to 8 weeks of age, but they also walked earlier than a control group of babies who were given no practice (see Figure 5-10). In another study, these investigators found that practice in sitting yielded similar results: Babies who were given practice in sitting for 3 minutes a day were able to sit upright longer than infants in a no-practice control group (Zelazo et al., 1988). Karen Adolph and her colleagues (Adolph, 2005; Adolph & Berger, 2006) collected diary records of infants' walking activities. These records showed that walking infants practiced keeping balance in an upright stance and locomotion for more than 6 hours a day, averaging between 500 and 1,500 walking steps per hour, so that by the end of each day, they had taken 9,000 walking steps and traveled the length of 29 football fields. Not surprisingly, infants with more walking experience were the most skilled walkers. But practice does not make perfect. There are limits to how far infants' motor development can be pushed. No stepping-trained baby has walked at 3 or 4 months of age, for example (Zelazo et al., 1988).

Mean number of walking responses per minute

PHYSICAL GROWTH

The study of children's physical growth has been guided by two principles: First, growth is characterized by *cephalocaudal development*—that is, growth occurs from the head downward; the brain and neck develop earlier than the legs and trunk. Second, growth follows a *proximal-distal pattern*, from the center outward; the internal organs develop earlier than the arms and hands.

Height and weight are the two principal measures of overall growth. Babies grow faster within their first half year of life than at any other age (National Center for Health Statistics, 2000). They nearly double their weight in the first 3 months and triple their weight by the end of the first year. From then on, infants' growth rate slows down, but babies still increase their weight by five or six times by 3 years of age. As they develop, their shape changes, too, as newborns' top-heavy light-bulb shaped bodies become increasingly cylindrical, and infants' center of mass moves from the sternum to below the belly button. The typical fat-bellied toddlers become slender kindergarteners (Adolph & Berger, 2006). Although growth appears to follow a smooth and gradual pattern as shown in Figure 5-11, daily observations reveal that growth is episodic rather than continuous (Lampl et al., 2001). Dramatic growth spurts can occur in a single day followed by days or weeks of no change. Normal healthy babies grow in fits and starts (Adolph & Berger, 2006).

In this section, we discuss the factors that influence infants' and children's growth in both height and weight, beginning with genetic factors and then turning to environmental factors such as nutrition, sanitation, and poverty. We also look at the evidence that people—at least in more developed countries—are growing taller. Our final discussion focuses on the growing problems of obesity and eating disturbance in the United States as well as on methods of preventing and treating these disorders.

Do Genes Affect Height and Weight?

Although both height and weight can be influenced by environmental factors, research suggests that genetic factors strongly influence these physical characteristics (Rutter, 2006; Tanner, 1990). Data from the Colorado Adoption Project, a longitudinal study that compares adoptive and biological parents and their adopted and natural children, indicate that genetic factors may determine as much as two thirds of the variance in height and weight (Cardon, 1994). In other research, too, scientists have found a strong relation between the weights of adopted children and their biological parents but no
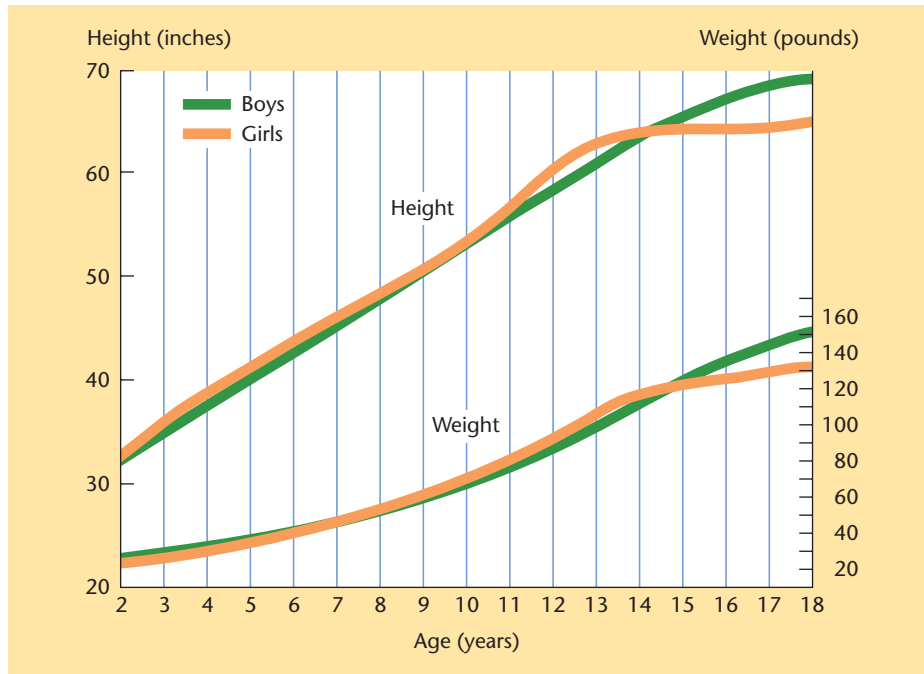
Figure 5-11

Male and female growth in height and weight

As they approach puberty, girls tend to gain height and, to a lesser degree, weight, faster than boys, but by the age of 14 or 15, boys surpass girls on both dimensions.

Source: National Center for Health Statistics, 1976.

relation between adoptees' and adoptive parents' weights (Stunkard et al., 1986b). Similarly, identical twins are twice as likely to resemble each other in weight as are fraternal twins (Stunkard et al., 1986a). Twins reared apart who did not share a common environment still show marked similarity in weight (Bouchard, 1994).

Gender has a clear effect on height and weight, as you can see in Figure 5-11. Girls tend to be a bit taller than boys from the age of 2 until about the age of 9, when boys catch up. At about 10.5 girls experience a growth spurt, shooting up above boys of their own age. At about age 14, however, girls' height almost plateaus, whereas boys continue to grow taller until they are about 18. The pattern for weight is similar; girls tend to weigh less than boys in the early years and then to exceed them in weight until about age 14, when their weight gain slows down while boys' gain continues to accelerate (National Center for Health Statistics, 2000; Tanner, 1990).

There are also wide individual differences in maturation rates. Because these differences become particularly obvious at adolescence, it is often assumed that they begin in adolescence. In fact, however, these differences are present at all ages, so that early maturers are always ahead of late-maturing peers. Tanner (1978, 1990), a pioneer in the study of physical growth, coined the term *tempo of growth* to describe this variability in the timing of changes in infants' and children's growth.

Being taller than their dance partners is a common experience for girls between the ages of about 11 and 14 because boys their ages are typically 2 to 3 inches shorter than they are. These preteens don't seem to mind, though.

The Influence of Environmental Factors

Growth is determined not only by genetic factors but also by environmental influences such as nutrition, physical and psychological disorders, and climate (Tanner, 1990). When environmental conditions are favorable, individual growth curves tend to be very similar, but in the presence of one or more unfavorable conditions, such as inadequate nutrition

or poor caregiving, growth rates can be seriously depressed (Bradley et al., 1994; Pollitt, 1994). Of interest, too, are the variations in growth rates attributed to differences in nationality, ethnicity, and socioeconomic class. There are fairly wide variations across regional areas; for example, people in Northwestern and Western European countries are taller than those in Southern Europe. Within the continent of Africa and among the countries of Central America, there are also substantial variations in height and weight. For example, in one African tribe, adults typically grow to 7 feet tall, whereas the bushmen of Zaire, Rwanda, Burundi, and the western coastal areas are on average about 4 feet tall. Moreover, people vary in growth within the same country; for example, in Brazil and India, people in urban areas, where nutrition and standards of living are high, tend to be taller than rural dwellers. In the United States, children in upper-middle-class families are both taller and heavier than children of families living in poverty (Centers for Disease Control, 2007; Martorell, 1984).

NUTRITION   Good nutrition is critical for proper development from infancy to adolescence. In this section, we examine nutrition's part in normal growth and under adverse conditions such as famine. The effects of over- and undereating are examined as well.

Bottle- Versus Breast-Feeding   In infancy, one of the first challenges parents face is the choice to feed their new baby breast milk or bottled formula. Although over the last century ideas about the relative virtues of each have fluctuated—in some decades, experts promoted the bottle, and in other periods, breast-feeding was more popular—we know today that breast-feeding is best for babies' healthy development (Blum, 2000). As Table 5-2 outlines, a host of benefits for both infants and mothers are associated with the choice to breast-feed. These include protection against infectious disease, better development of the brain and nervous system, and a reduction in the likelihood of sudden infant death syndrome (SIDS). Recently, young children in Great Britain (age 5) and in New Zealand (ages 7–13) who were breast-fed were found to have higher intelligence than bottle-fed children but only if the infants had a specific genetic makeup (Caspi et al., 2007). Specifically, children who were genetically predisposed to benefit from fatty acids present in breast milk showed the advantage in IQ; those without this genetic makeup did not benefit from breast-feeding. Although mothers who are better off socioeconomically are more likely to breast-feed as well as have smarter children, these findings were evident even after statistically controlling for the contribution of socioeconomic factors.

For mothers, breast-feeding is more convenient (no refrigeration or warming is required). It helps women lose the weight gained during pregnancy and delays ovulation. It also promotes closeness between mother and baby. Breast-feeding is particularly important for mothers and children in developing countries. Relative to the incomes of most families in these countries, formula is expensive; because of this, women often dilute the formula, thus endangering the health of their babies. The lack of clean water also often leads to infected formula and increased rates of illness. According to UNICEF (United Nations Children's Fund, 2004), bottle-fed babies in developing countries are fourteen times more likely than breast-fed babies to die from diarrhea and four times more likely to succumb to respiratory ailments. If all babies were fed only breast milk for the first 6 months of life, the lives of an estimated 1.5 million infants would be saved every year, and the health and development of millions of others would be greatly improved.

In the United States, about 60% of mothers breast-feed for several months, but after the baby reaches 6 months of age and begins eating some solid foods, this percentage drops sharply. Women who are over 25, of higher socioeconomic status, and better educated are more likely to breast-feed than younger, poorer women. But even in this group, returning to employment outside the home reduces the length of breast-feeding. Some mothers are unable to breast-feed because of medical conditions, such as AIDS

Table 5-2   Advantages of breast-feeding for infants and mothers

Infants	
Short-Term Benefits of Breast-Feeding	**Long-Term Benefits of Breast-Feeding**
Breast milk contains nutritionally balanced ingredients, including proteins, cholesterol, and lactose that together support development of the brain and nervous system	Breast-fed children have slightly higher IQs than bottle-fed children.
Supports appropriate weight gain	Breast-fed children demonstrate better reading comprehension.
Strengthens infant's immune system and reduces risk of diarrhea and infectious diseases	Breast-fed children are less likely to have childhood cancer, allergies, or diabetes.
Promotes more efficient absorption of iron, lessening likelihood of iron deficiencies	Breast-fed children have denser bones in preadolescence.
Reduces likelihood of SIDS	
Lessens likelihood of allergies	
Builds denser bones	
Makes shift to solid food easier	
Mothers	
Breast-Feeding	
Builds closeness to her baby	
Promotes faster weight loss after baby's birth	
Delays ovulation (but is not a reliable form of birth control)	
Is convenient	

Sources: Blum, 2000; Caspi et al., 2007 Dewey, 2001; Fredrickson, 1993; Harwood & Fergusson, 1998; Hoppu, Kalliomoki, Laiho, & Isolauri, 2001; Jones, Riley, & Dwyer, 2000; Lifshitz, Finch, & Lifshitz, 1991; Newman, 1995.

or tuberculosis, or because they are being treated for illnesses. Although breast-feeding confers advantages, it is important to note that babies who receive appropriate formula-based bottle nutrition develop normally, especially in Western countries where bottle-feeding is safe.

Nutrition and Physical Growth   Nutrition plays a controlling role in physical growth. Wartime restrictions on food consumption provide clear evidence of this fact. In Europe during World Wars I and II, for example, there was a general trend toward less growth. In contrast, in the period between these wars, there was a general increase in growth, especially in weight (Tanner, 1990). Nutritional factors can also affect the age at which children enter puberty; during World War II, girls in occupied France on the average did not achieve menarche (the onset of menstruation) until they were 16 years old, approximately 3 years later than the prewar norm (Howe & Schiller, 1952). Of course, stress probably contributed to this delay as well.

Studies of people during times of peace have also demonstrated the role of nutrition in growth. In a study in Bogotá, Colombia, researchers found that the provision of food supplements for entire families from midpregnancy until a child was 3 years old effectively prevented severe growth retardation in children at risk for malnutrition (Super et al., 1990). Moreover, the children who received the food supplements remained taller and heavier than control children at 6 years of age, 3 years after the intervention ended. Equally impressive were the results of a study in rural Bangladesh in which researchers found that changing traditional unhygienic practices by means of educational and supportive interventions improved children's health, growth, and nutrition (Ahmed et al., 1993). When parents used safer methods of food preparation and waste disposal, they

iron-deficiency anemia A disorder in which inadequate amounts of iron in the diet cause listlessness and may retard a child's physical and intellectual development.

catch-up growth The tendency for human beings to regain a normal course of physical growth after injury or deprivation.

secular trend A shift in the normative pattern of a characteristic, such as height, that occurs over a historical time period, such as a decade or century.

lessened food contamination and reduced the incidence of diarrhea, which interferes with the absorption of essential minerals and vitamins.

Finally, research on the effects of poverty in both the United States and other nations highlights the importance of providing nutritional supplements and controlling disease (Pollitt, 1994). **Iron-deficiency anemia**, a condition in which insufficient iron in the diet causes listlessness and may retard children's physical and intellectual development, is common among poor minority children and children in low-income countries, especially countries with little meat in their diets (Conrad, 2006). Interventions in Kenya and Zanzibar involving iron or meat supplements were found to improve these children's rates of growth as well as their motor and mental development (Neumann et al., 2007; Olney et al., 2006).

CATCH-UP GROWTH   A corrective principle, referred to as **catch-up growth**, operates after children are born: Children who are born small or who experience early environmental injury or deprivation are usually able to catch up to normal physical growth (Emons et al., 2005). If they are deflected from their genetically governed growth trajectory by acute malnutrition or illness, when the missing food is supplied or the illness terminated they catch up toward their original curve (Tanner, 1970). However, the degree of catch-up growth the child can achieve depends on the duration, severity, and timing of the original deprivation and the nature of the subsequent treatment or therapy. In a study of the effects of nutritional supplements following severe malnutrition, researchers found that malnourished infants who had a 5% deficit in height were able to catch up, but infants with a 15% deficit remained significantly shorter (Graham, 1966). Catch-up growth following severe malnutrition may also be limited to only some aspects of growth. In a 20-year longitudinal study of severely starved children, a program of nutritional intervention failed to enable full development in head circumference (and presumably brain development) and produced only some catch-up in height (Stoch et al., 1982). This impact of malnutrition on brain development may, in part, account for the intellectual and attentional deficits shown by malnourished children (Neumann et al., 2007; Shonkoff & Phillips, 2000). Timing is also critical in determining the degree of catch-up growth. Pathology and undernutrition early in life can have serious consequences, and children starved in utero usually show only partial catch-up (Pollitt et al., 1992; Tanner, 1990). In general, the earlier and more prolonged the malnutrition, the more difficult it is for interventions to be fully effective in helping children achieve normal growth.

People Are Growing Taller

According to scientists who have measured bones exhumed from gravesites, between the eleventh and fourteenth centuries, the average Englishman was about 5 feet, 6 inches tall, whereas today the average adult British male is 5 feet, 9 inches tall. This is a **secular trend**—a shift that occurs in the normative pattern of a particular characteristic over some historical time period, such as a decade or a century (Figure 5-12). It is also an average. The same increase in height may not occur at every level of society. For example, in the United States, most people in the upper 75% of the socioeconomic range have probably reached their maximum growth potential (Centers for Disease Control, 2007). People in less advantaged segments of society will likely continue to make gains. In other countries, there are different patterns of change. In the Netherlands, for instance, people are continuing to gain in height and weight regardless of socioeconomic level; the average Dutch male is now 6 feet, 1 inch, and Dutch women average 5 feet, 8 inches in height (Bilger, 2004). In Japan, England, and Norway increase in stature has apparently come to a halt (Murata, 2000; Tanner, 1990).

| 4'6" | 4'2" | 5'7" | 5'2" | 5'8" | 5'3" | 5'10" | 5'4.5" | 6'0" | 5'7" |

1 million B.C.   1710   1921   1997   2050
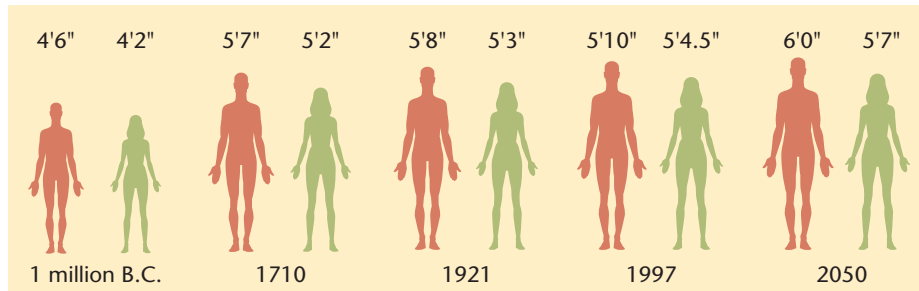
Figure 5-12

Height gains across the centuries and millennia

By 1997, the average American had gained 2.5 to 3 inches in height since the early eighteenth century, and expectations are that both men and women will double this gain by 2050. By that time, we'll have become a foot and a half taller than our prehistoric ancestors!

Source: Richard Steckel, Ohio State University, 1997.

Americans are not only growing taller, but as a consequence of their added height, their feet are growing longer, too, gaining about a third of an inch in each generation. The average college student's grandfather probably wore a size 7 shoe, whereas today, the average American male wears between size 9 and 10. And not only are Americans and their feet increasing in size; Americans are achieving these growth increases at earlier ages than in the past. A hundred years ago, people didn't attain adult height until the early or mid-20s, but today, many 16- or 17-year-olds have reached their full stature.

There are several reasons for these historical trends toward greater height. First, health and nutrition have improved in many countries of the world. Growth-retarding illnesses have come under control, particularly those that strike in the first 5 years of life, such as *marasmus* (caused by insufficient protein and calories) or *kwashiorkor* (caused by insufficient protein). In many areas, nutritional intake has improved in terms of both quantity of food consumed and balance among essential food groups (Tanner, 1990). Medical care and personal health practices have also improved. Second, socioeconomic conditions have generally improved; child labor is less common, and living conditions such as housing and sanitation have improved. Third, the influence of genetic factors has been affected by such things as intermarriage among people of different racial and ethnic backgrounds, which produces increases in height in offspring. In the future, if we experience major changes in the environment brought about by spectacular medical discoveries, natural disasters like famine or global warming, or a substantial increases or decreases in pollution levels, the average height of the population could shift again.
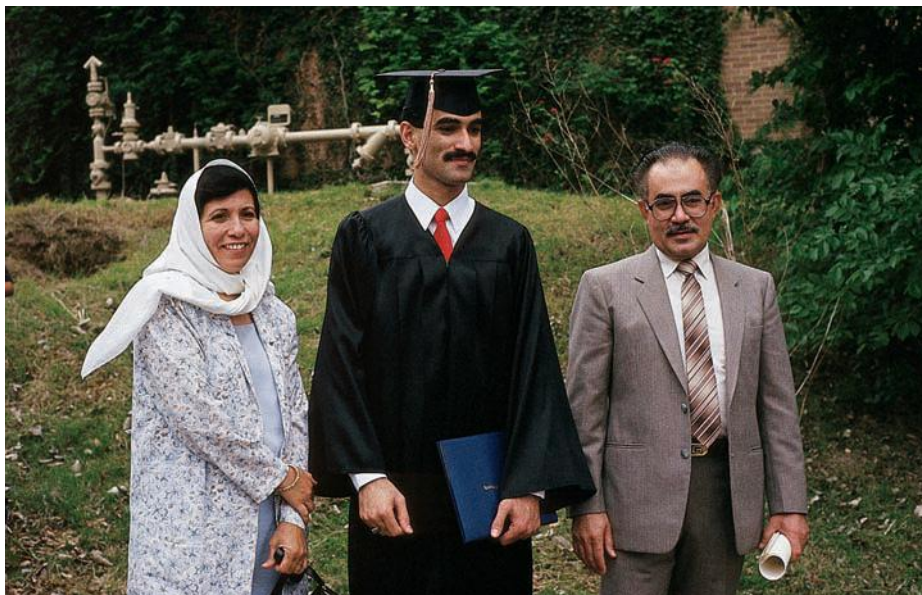
Happiness floods the faces of this Saudi Arabian couple as they pose with their son after his graduation ceremonies at a Texas college. Towering over his parents, the graduate demonstrates that the newer generation of young people is indeed taller than their parents.

Are We Growing Heavier? Obesity and Eating Disorders

obesity A condition in which a person's weight is 30% or more in excess of the average weight for his or her height and frame.

Children and adults in the United States as well as many other places such as England, Western Europe, Japan, and Australia are growing heavier. **Obesity**, the condition in which a person's weight is 30% or more over average weight for his or her height and frame, has been on the rise since the early 1960s (Raynor & Epstein, 2001; and see Figure 5-13) when about 5% of children were overweight to 2004 when almost 18% were obese (National Center for Health Statistics, 2006). This rise has occurred despite the fact that U.S. children are born into a society that reveres healthy good looks. Although Americans' preference for tall, slender people over short, overweight people may seem narcissistic, the emphasis on losing weight and keeping fit is based partly on realistic concerns about physical health and the avoidance of illness. Unfortunately, the desire to be attractive and physically fit leads many to a near obsession with weight-reduction groups, magazines about weight and diet, and fad diets; it is young girls who are most likely to suffer from this preoccupation with weight. In a study of 5- to 8-year-old Australian children, nearly 60% of the girls wanted a thinner figure, whereas 35% of the boys wanted to be thinner. Girls hoped to be thinner as teenagers as well (Lowes & Tiggerman, 2003). Indeed, by midadolescence, perhaps 70% to 80% of American girls have been on at least one diet (Attie & Brooks-Gunn, 1989; Cowley, 2001). In this section, we look at this continuing American struggle to be thin and consider the problems of obesity and of eating disorders such as anorexia and bulimia.

WHY DO CHILDREN GAIN TOO MUCH WEIGHT?   In North America, nearly 18% of children are obese (National Center for Health Statistics, 2006). Although older children and adolescents have the highest rates of obesity, about 14% of preschoolers are obese (Raynor & Epstein, 2001). This trend toward obesity varies across different ethnic groups and genders. More than 20% of Mexican American boys and African American girls are overweight (National Center for Health Statistics, 2006); Asian Americans are the least likely to be overweight.

Genetic factors play a crucial role in obesity. Although environmental factors contribute to weight gains at certain ages, children who are overweight tend to stay that way. Overweight infants tend to become obese children, who develop into obese adolescents and continue to be obese into adulthood (Jeffrey, 2001; Ong & Loos, 2006). Genetic variation explains this overall stability in body mass index (BMI)—a measure of a person's weight in relation to her height (Cardon, 1994). Genetics also explains why

Figure 5-13

Overweight (obese) children and adolescents, 1963–2000

Over close to 40 years, obesity (being 30% or more over average weight) roughly tripled among both teens and preteens.

Source: National Center for Health Statistics, 2002.
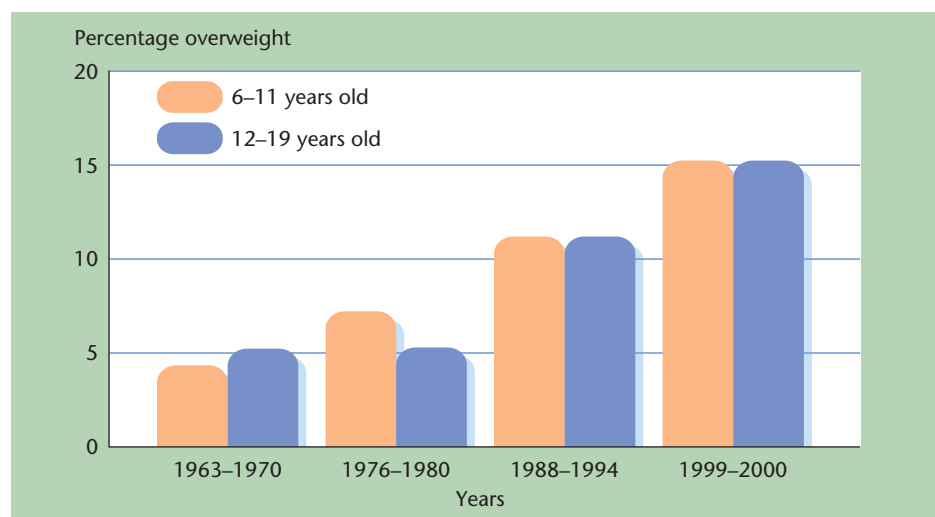
adopted children are more likely to be obese if their biological parents are, regardless of their adoptive parents' weights (Stunkard et al., 1986b). Other evidence of the role of genetics comes from studies of early infant behavior. Milstein (1980) found that new-born infants with two overweight parents were more responsive to the contrast between a sweet-tasting solution and plain water than were infants of normal-weight parents. This stronger sensitivity to taste predicted the children's weight at 3 years of age, sug-gesting that a preference for sweetness early in life increases the risk for obesity. Even babies' genetically determined sucking patterns predict later obesity (Agras, 1988).

All this sounds as if genetic factors completely determine obesity, but you do have some control over your waist size. A lifestyle with little exercise, too much TV watching, and too much junk food is also a major culprit (Rao, 2006). This lifestyle pattern starts early. Children's eating behavior imitates their parents' food choices and eating behavior (Ray & Klesges, 1993). Parents of obese children encourage them to eat more than their thinner siblings (explaining that they're bigger, so they need more food) and offer them eating prompts twice as often as parents of normal-weight children do. As Box 5-2 shows, teaching children how to recognize when they are hungry and to stop eating when they feel full may help prevent obesity. Rewarding children for eating everything on their plates may teach them to rely on external instead of internal cues in deciding whether to eat, and for some children, this leads to eating whenever food is in sight.

Obese children and adolescents often suffer from a variety of physical problems, including asthma, sleep problems, hypertension, and diabetes (Beebe et al., 2007; Cruz et al., 2005). They may also run the risk of having high cholesterol levels, especially if they are boys, which can predispose them to high blood pressure and other cardiovascu-lar problems (Labarthe, 1997; Pinhas & Zeitler, 2000). Overweight children suffer psy-chologically as well because of body-image disturbances and discrimination by their (thinner) peers (Bierman, 2004; Storch et al., 2006). Peers tease obese kids, exclude them from groups, and choose them last for athletic activities. For their part, because they fear other children will ridicule their bodies, chubby children often seek excuses to avoid gym class and thus get less exercise than they should. Overweight adolescents date less and are less likely to be admitted to prestigious colleges than their thinner classmates. Clearly, the costs of being obese can be high.

TREATING OVERWEIGHT CHILDREN   Two ideas seem most promis-ing for controlling children's weight. First, it is important to involve the family—par-ents and perhaps siblings and peers as well—in any treatment program. Parents often encourage their children's overeating not only by tying eating to external cues but also by their own eating habits. Researchers are finding that working with entire families in attempting to reverse these processes is relatively successful (Epstein et al., 1994, 1995, 1997; Nader, 1993). They have also found that such interventions as reducing the likelihood of stressful interactions with family members at mealtime can help curb overeating (Israel, 1988). In one family-based study, researchers found that by encour-aging parents to serve as models of good eating and physical exercise, 34% of the chil-dren succeeded in losing 20% or more of their overweight poundage; at the close of the 10-year study, 30% were no longer obese (Epstein et al., 1994). Even school-based peer tutoring programs show promise as an obesity prevention strategy. Older students (fourth to seventh grades) who were taught lessons of healthy living—nutrition, physi-cal activity, and healthy body image—were paired with younger students as "healthy buddies." Compared to controls, both older and younger children increased their knowl-edge about healthy living and showed a smaller increase in blood pressure; the older children gained less weight, and the younger ones grew taller (Stock et al., 2007).

The second promising idea for controlling children's weight is to increase the child's physical expenditure of energy in innovative ways (NICHD Child Care Research Net-work, 2003). We all know that taking it off and keeping it off require not only watching food intake but burning off calories as well. A recent study following the "America on the Move" protocol in which families made two small lifestyle changes—walking an

BOX 5-2

Child Psychology in Action

LEARNING NOT TO "CLEAN YOUR PLATE"

Parents play a major role in teaching children about eating. They help children learn what to eat, when to eat it, and how much to eat (Rozin, 1996). Unfortunately, parents may also teach children to rely more on external cues—such as feedback from them or the mere presence of food—than on cues that come from their own bodies that tell them when they're hungry and when they're not. When a child says, "I'm full" and the parent says, "No, finish what's on your plate," the parent is giving a clear message that it's the external cue that's important.

Birch and colleagues (Birch & Fisher, 1995; Birch, McPhee, Shoba, Steinberg, & Krehbeil, 1987) showed that children can learn to rely on either internal or external feedback depending on adult responses to their eating behavior. Twenty-two preschoolers attended a series of special snack sessions over a 6-week period. In one group, the adult researchers helped the children focus on their sensations of hunger and fullness and stressed how these internal reminders tell us when to eat and when to stop eating. The children felt their stomachs and discussed how eating changes our feelings of hunger. In a second group, external cues were the focus. A bell rang to signal "snack time," and children were rewarded with such things as stickers for cleaning their plates.

Then the groups were combined, and everyone was given a yogurt snack to eat, after which they were given a chance to eat another snack of cookies and granola bars. Children in the first group, who had been taught to rely on their internal signals, consumed less of the second snack, but children who had learned to depend on external cues such as rewards and adult urging ate just as many cookies and granola bars as they had yogurt no matter how full they were. It seems that the social context can influence which kinds of cues children learn to rely on in choosing to eat or stop eating. Other more recent studies with older children show similar counterproductive effects of pressuring children to eat: Intake is higher and children's feelings about eating are more negative (Birch, 2006; Galloway et al., 2006).

This work helps us to understand why children are getting fatter. In recent years, portion sizes have increased, and "supersizing" is common in fast-food establishments. It wouldn't matter if children regulated their food intake so they stopped when they were full, but by the age of 5, children will eat more when portions are larger (Rolls, Engell, & Birch, 2000, and see Figure 5-14). Younger children (3-year-olds) seem to know better; for them, portion size does not alter consumption.

Children can be encouraged to eat more healthily in a number of ways (Birch, 2006; Ray & Klesges, 1993). Allowing children to have more control over their food choices and the amounts they consume may help

additional 2,000 steps per day and reducing calories by replacing sugar with noncaloric sweeteners—found that 7- to 14-year-olds were more likely to maintain or decrease their weight in comparison to children in a control group (Rodearmel et al., 2007).

A study by Epstein and colleagues suggests that choice may be important in getting children to increase their level of exercise (Epstein et al., 1995). These researchers gave children two options: They could spend less time in sedentary behaviors, such as watching TV and playing computer games, or they could increase their physical activity by riding an exercise bike or exercising to an aerobics tape. As you can see from Figure 5-15, decreasing sedentary activity was more effective in producing weight loss than was increasing specific exercises. Based on significant improvements in fitness among the children who reduced their sedentary activities, the investigators speculate that these children may have substituted other, higher-energy-expenditure activities of their own choice. Parents had been instructed to make easily available such things as skates and bicycles.

Not only is increased physical activity helpful for weight loss, but it leads to other benefits as well, such as increases in perceived body satisfaction, overall physical self-worth, and improved motor skills (Goldfield et al., 2007; Korsten-Reck et al., 2007). In spite of the success of some recent weight reduction programs for children, maintaining
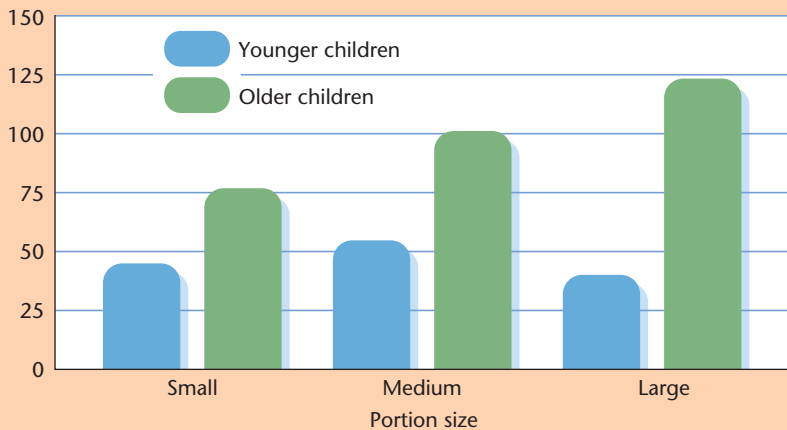
Figure 5-14

Do we get smarter with age or not?

Researchers served two groups of children one of three different-size portions of macaroni and cheese at lunch. The 3.5-year-old children were not affected by the portion sizes, but among the 5-year-olds, the bigger their portion, the more they ate.

Source: Rolls, Engell, & Birch, 2000.

children learn more about how foods help us balance energy. Involving children more in food-related activities, such as helping to shop and prepare foods, may give them more awareness of the importance of good nutrition. But most important, modeling good eating behavior for children shows them what and how much to eat. Children are more likely to eat a food when they see an adult eating it. They tend to develop the same food preferences as their parents. If parents eat a balanced and moderate diet, their children are likely to follow suit, but if parents eat large amounts of foods with saturated fatty acid content, children are likely to do the same. Perhaps parents should look at mealtime as an opportunity rather than a challenge. The need to teach their children healthy eating habits might be just the nudge they need to watch their own diets and keep in shape!

weight loss or preventing weight gains in the first place remains a serious challenge. Not only do lifestyle issues, such as lack of exercise and the widespread availability of fast food that is high in fat and calories, make it hard for children to keep their weight in check, but genetic predispositions to become overweight among some children make it difficult as well.

EATING DISORDERS IN ADOLESCENCE   Just as obesity can cause physical and psychological problems, being underweight can bring on distressing and even life-threatening conditions. The two most common eating disorders in the United States, anorexia and bulimia, afflict women more than men and generally strike between the age of 10 and the early 20s. Although there is some indication that eating difficulties tend to decline in frequency in the transition to adulthood, a number of women continue to be dissatisfied with their bodies and indulge in repetitive dieting. Males, on the other hand, who are less affected in adolescence and early adulthood, may begin to gain weight after beginning college and for the first time become concerned with dieting and body image.

   People with **anorexia nervosa** have an unaccountable dread of being overweight and diet constantly to avoid that state. They see themselves as obese even if they are quite

anorexia nervosa An eating disorder in which people, usually young women, are preoccupied with avoiding obesity and often diet to the point of starvation.
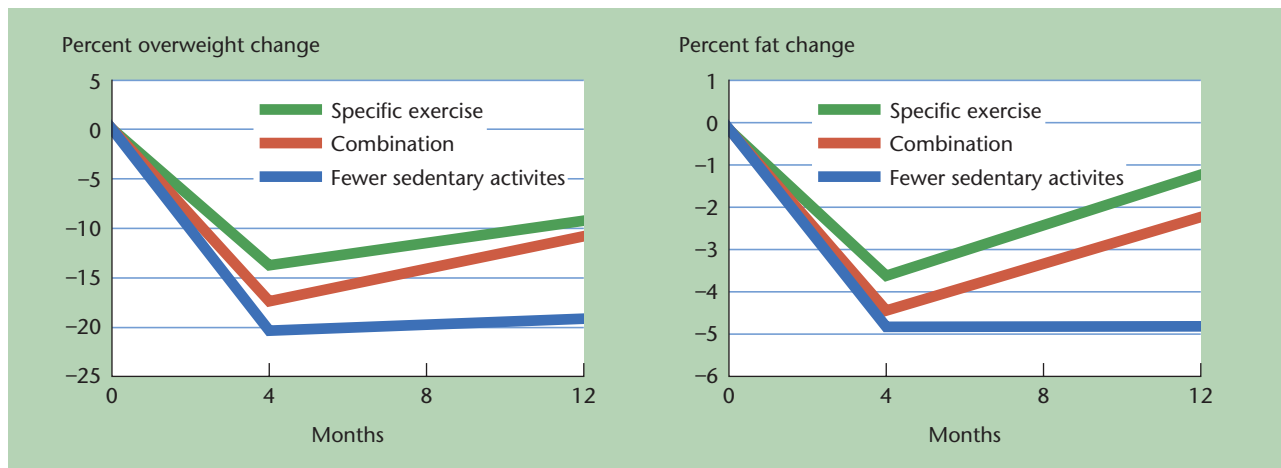
Figure 5-15

Reducing sedentary activities helps reduce weight

Children who spent less time watching TV and playing computer games lost the most weight. Neither a specific exercise regimen nor the combination of exercise and reduction of sedentary activities worked as well!

Source: Epstein et al., 1995.

slender, and although they may be preoccupied with food and may even hoard it, they eat less and less. Young women in particular may lose up to 25% of their body weight (some lose even more) and become so weak that they must be hospitalized to redress fluid and electrolyte imbalances. Without continuing intervention, these skeletal creatures, who often have been attractive, bright, and high-achieving young women, may die from starvation or suicide (Tinsley, 2003).

bulimia nervosa An eating disorder in which people, usually young women, alternate periods of binge eating with vomiting and other means of compensating for the weight gained.

Bulimia nervosa is an eating disorder in which the person—again, typically a young woman in adolescence or early adulthood—goes through cycles of seemingly uncontrollable binge eating followed by either vomiting or the use of laxatives to compensate for the bingeing and to prevent weight gain. Sometimes, this disorder is seen in young women pursuing activities that stress slimness such as gymnastics, cheerleading, running, and figure skating or ballet (Moreno, 2006; Sherwood et al., 2002). Bulimics, like anorexics, risk fluid and electrolyte abnormalities, and the loss of stomach acid through vomiting and the frequent induction of diarrhea can cause other metabolic problems (Mehler, 2003).

Most cases of bulimia emerge during the late teens and early 20s, whereas anorexia may begin at a variety of points throughout adolescence, especially at puberty (Attie & Brooks-Gunn, 1989). Bulimia affects between 1% and 3% of adolescent and young women (Moreno, 2006); anorexia affects probably less than 1% (Tamburrino & McGinnis, 2002). Both disorders are more prevalent in industrialized societies such as the United States, Canada, Australia, Japan, New Zealand, South Africa, and European countries.

Despite some outward similarities, the two disorders are quite different. Unlike anorexics, young women with bulimia rarely diet to the point of starvation and death; anorexics, however, do sometimes engage in bingeing and purging. In contrast to anorexic young women, who tend to be of normal weight before the illness and to be socially withdrawn, bulimics are sometimes obese before the onset of their illness and are typically extroverted and have voracious appetites. Women with both disorders may exhibit depressive symptoms, but whereas bulimics often have a poor self-image and low self-esteem, anorexics have a tendency toward *obsessive-compulsiveness* (the tendency to have recurrent obsessions or compulsions to do particular things that take up

(a)   (b)

The treatment of anorexia can be remarkably successful. From this girl's shocking appearance at diagnosis (a), one might not have believed that she could show the health and happiness her post-treatment image shows (b).

time and energy and that may cause marked psychological distress), perfectionism, and a strong need to control their environments (Fairburn et al., 1999; Levenkron, 2000). It may be that controlling their food intake is, for some anorexics, the only control they feel able to exert over their lives.

Most anorexics and bulimics in the United States are of European American descent and relatively high socioeconomic status (Benokraitis, 1996). African American girls are less likely to develop eating disorders, in part, because of their lower level of dissatisfaction with their body image relative to white females of the same weight (Moreno, 2006). Girls with eating problems often come from families with histories of eating disorders or substance abuse (alcohol, marijuana, uppers, downers) (Laporte et al., 2001). The families of bulimic adolescents are often chaotic, conflict ridden, and stressed, and family members have difficulty communicating their feelings (Fisher & Brone, 1991; Rodriguez Martin et al., 2005). The families of anorexic girls are often high achieving and protective; mothers are dominating, intrusive, and overbearing, and fathers are "emotional absentees" (Carson & Butcher, 1992; Karawautz et al., 2003). It is important to remember, however, that family members' behavior may represent responses to the behavior of the anorexic or bulimic girl. Much remains to be discovered about the causes of these eating disorders and it will likely be the case that genetic as well as environmental factors play a role in the development of these problems.

Treating anorexia may require initial hospitalization and physical intervention. Although in-hospital behavioral modification techniques have succeeded in normalizing anorexics' eating behavior and achieving weight gain, the effects of this type of therapy seem to be short-lived (Mehler & Crews, 2001). Longer term psychotherapy that includes the family has had some success (Miller & Pumariega, 2001). However, according to one estimate, fewer than half of adolescents with this disorder make a complete recovery (Zerbe, 1993), and 5% to 10% die either from starvation or by overt suicide (American Psychiatric Association, 2000). Treating bulimia is generally more successful than treating anorexia. A variety of approaches, including individual and family psychotherapy, support groups, nutrition and eating education (recognizing satiety or fullness), and in cases where depression is evident, antidepressant medication, have been successful in treating bulimia (Bergh et al., 2002; Mitchell et al., 2001; Tinsley, 2003). Unfortunately, many adolescents never seek treatment for this disorder.

SEXUAL MATURATION

Whereas physical growth, except for one or two growth spurts, is more or less gradual, sexual maturation arrives with a flourish. Suddenly, a girl begins to menstruate, a boy has his first ejaculation, and both know or come to know that they are no longer children but young adults, capable of fully expressing their sexuality and reproducing their species. **Puberty**, or the onset of sexual maturity, has long been held as a time of stress for the adolescent, when the intensity of new drives and the social pressures for new behaviors and new responsibilities may cause conflict and confusion. In this section, we describe the actual changes that occur with puberty and then explore the question of whether young people are generally experiencing puberty earlier and earlier. We discuss whether maturing earlier or later than one's peers has a significant effect on a young person.

The Onset of Sexual Maturity

Puberty is marked by the sudden bodily growth and changes that take place when the hypothalamus, at the base of the brain, stimulates the **pituitary gland** (see Figure 5-16) to secrete certain hormones. **Hormones** are powerful and highly specialized chemical substances that are produced by the cells of certain body organs and that have a regulatory effect on the activities of certain other organs. In this case, the pituitary gland's hormones cause the *adrenal cortex* (the outer layer of an adrenal gland) and the *gonads* (in males, the testes, and in females, the ovaries) to initiate a growth spurt. As Table 5-3 shows, in girls, this spurt begins with breast development, and in both sexes, the appearance of pubic hair is an early sign of puberty. These characteristics, along with voice change in boys, are considered *secondary sex characteristics*, which are not directly involved in sexual reproduction. *Primary sex characteristics*, which are involved in the reproductive process and which evolve a few years after the first secondary characteristics appear, include, in males, **spermarche**, or the capability of the testes and associated internal organs to produce sperm-containing ejaculate. In females, primary sex characteristics include the changes in the reproductive organs that culminate with **menarche**,

puberty The onset of sexual maturity.

pituitary gland A so-called master gland, located at the base of the brain, that triggers the secretion of hormones by all other hormone-secreting, or endocrine, glands.

hormones Powerful and highly specialized chemical substances that are produced by the cells of certain body organs and that have a regulatory effect on the activity of certain other organs.

spermarche In males, the first ejaculation of semen-containing ejaculate.

menarche In females, the beginning of the menstrual cycle.

Figure 5-16

The pituitary gland

Cutting through the cerebrum, we can see the location of the pituitary gland, which controls the secretion of important human hormones, including those that stimulate cell growth and replication.

Source: Adapted from Postlethwait & Hopson, 1995.
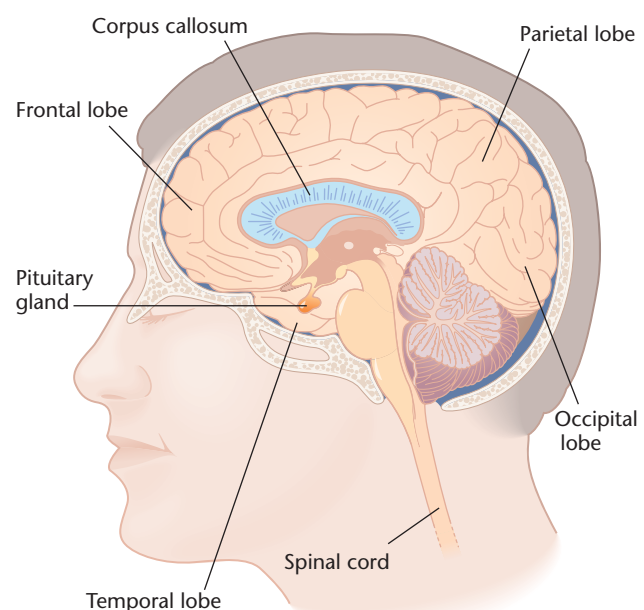
Table 5-3　Sexual maturation: A timetable

Average Age of Onset	Girls	Boys
10	Breasts (breast buds) begin to develop	
11	Pubic hair appears; it is sparse and slightly pigmented	**Testes and scrotum begin to grow**
12		Pubic hair, lightly pigmented, begins to appear
12 to 13	Underarm hair begins to appear	
13	Breasts continue to enlarge; areola and nipple project above contour of breast	**Spermarche: first ejaculation of semen**
13 to 14	**Menarche: beginning of menstruation**	
14	Pubic hair becomes denser, but area covered is smaller than in adult woman	Underarm and facial hair begin to appear
15	Breasts and pubic hair coverage are fully mature	**Penis, testes are fully developed** Pubic hair coverage is complete Mustache and beard hair begin to grow

Note: Primary sex characteristics are in boldface type.

Sources: Petersen & Taylor, 1980; Tanner, 1978; Turner & Rubinson, 1993.

or the beginning of *ovulation*. Each month, an egg, released from an ovary, begins its journey through the fallopian tubes to the uterus; there, if the egg is not fertilized, it is expelled in the menstrual flow.

In both female and male adolescents, the rising concentrations of hormones stimulate the development of both primary and secondary sex characteristics. In females, **estrogens** are crucial to the maturation of the reproductive system, including the ovaries, fallopian tubes, and uterus, and to the onset of ovulation and menstruation. **Progesterone** helps regulate the menstrual cycle and readies the uterus for the reception and nurturing of a fertilized egg. In males, **testosterone**, the most important of several *androgens*, is essential to the maturation of the penis, testes, and other organs of the reproductive system and to the production of sperm. Male sexual motivation is influenced by testosterone; female sexual motivation is less dependent on hormonal secretions.

As you can see from Table 5-3, even the attainment of secondary sex characteristics is gradual, with menarche and spermarche occurring 2 to 3 years after the beginning of the maturation process. Nevertheless, it is because these two later events signal such a marked change in the person, not only physically and physiologically but also psychologically, that they are considered a major turning point. For some women, menarche is the "true," or real, onset of puberty (Brooks-Gunn & Ruble, 1983).

In industrialized countries, at least, young women have been reaching menarche at earlier and earlier ages over the past decades. In the United States, for example, young women in the late 1960s tended to experience menarche nearly 2 years earlier (at 12.5 years) than their mothers had (at 14.4 years) (Herman-Giddens et al., 1997). As Figure 5-17 shows, in the countries of Finland, Norway, and Sweden, the age of menarche dropped about 3.5 years in a little over a century. This trend to earlier menarche is slowing down in many Western European countries and among middle-class girls in the United States (Helm & Grolund, 1998; Wellens et al., 1990; Wyshak & Frisch, 1982). However, among certain groups (e.g., African American girls), the onset of menarche is now even earlier—at age 8 or 9 (Herman-Giddens et al., 1997; NHLBI Growth and Health Study Research Group, 1992). The reduction in age at menarche has not been uniform around the world, however. In certain developing countries, such

estrogens Hormones that, in the female, are responsible for sexual maturation.

progesterone A hormone that, in females, helps regulate the menstrual cycle and prepares the uterus to receive and nurture a fertilized egg.

testosterone A hormone that, in males, is responsible for the development of primary and secondary sex characteristics and is essential for the production of sperm.

Figure 5-17

Decline in the age of menarche

In the Scandinavian countries represented here, the age of first menstruation declined considerably over a little more than a century and a half. Although the data for the United Kingdom and the United States do not cover the same time period, their trend suggests that the rate of change in menarche in all these countries is similar.

Source: Roche, 1979.
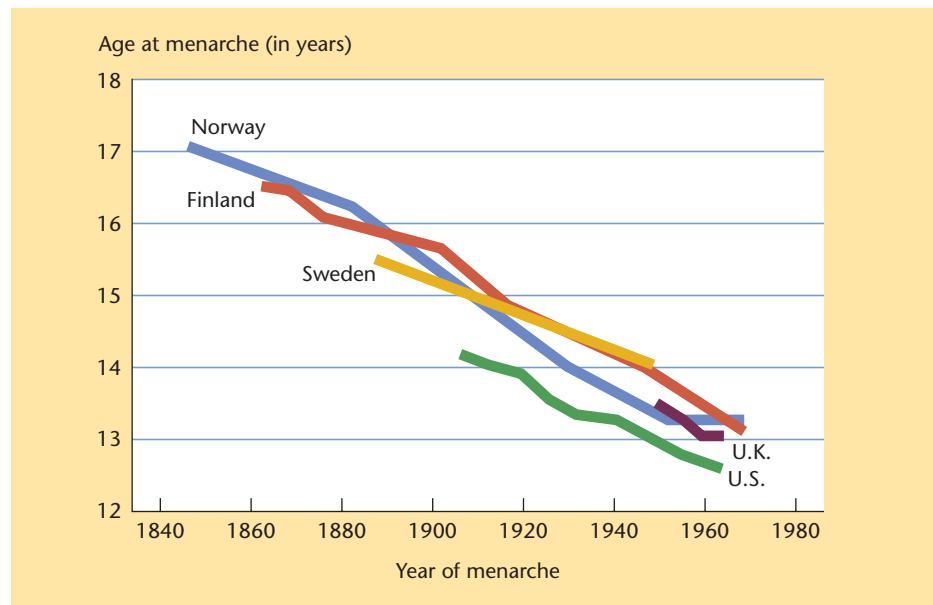
as some parts of New Guinea, the median age of menarche is still very late—18 years (Malcolm, 1970).

What Determines the Timing of Puberty?

Inheritance plays some role in the timing of menarche; girls whose mothers matured early tend to mature early themselves. But environmental factors also contribute to this important event. For example, gymnasts, figure skaters, and ballet dancers who practice intensively, perform regularly, and diet to keep fit may delay the onset of menstruation by as much as 1 year (Brooks-Gunn & Warren, 1985). In fact, of the dancers in one study, only 30% were either early or "on time," in contrast to 80% of a comparison group of girls who were not dancers (Brooks-Gunn, 1988). After girls reach menarche, their periods may not be regular if they train hard and keep their weight low; for example, runners and gymnasts sometimes stop menstruating, or become *amenorrheic*. Such girls can literally turn their menstrual cycles on and off by stopping and restarting their training regimen (Brooks-Gunn & Warren, 1985).

Parent-child relationships can also alter the timing of sexual maturation (Ellis, 2004). In a longitudinal study, Steinberg (1987) found that systematic changes in family systems around the time of puberty affected the timing of young people's sexual maturation, and this maturation affected family relationships by increasing conflicts between youth and parents. In families where parents and children were emotionally distant, young people tended to reach sexual maturity earlier, whereas the closer parent and child were, the slower the process of maturation seemed to be. Recent research confirms these findings: Girls whose mothers and fathers were more supportive toward them in early childhood reached puberty later (Ellis & Essex, 2007); girls who experienced more family conflict and father absence reached menarche earlier (Belsky et al., 2007; Ellis et al., 1999; Moffitt et al., 1992). These findings may be explained by suggesting that stress leads to earlier maturation, or they may also reflect genetic inheritance. For example, statistics show that women who mature early and have children early are likely to become single parents, which exposes their children to more stressful conditions and father absence. Further research is needed to determine the relative contributions of inheritance and the environment to the timing of sexual maturation.

The Effects of Early and Late Maturation

Does variation in the rate of maturation make a psychological difference for children? To some extent, it depends on gender. For boys, there are some risks and some advantages in maturing early, but for girls the disadvantages clearly outweigh the advantages.

Boys who mature early have the advantage of being considered by their peers to be more physically attractive, athletic, masculine, and popular; late maturing boys are viewed as less attractive and masculine, more childish, bossy, talkative, and attention seeking (Jones & Bayley, 1950). However, there is a downside for boys who reach maturity early: Early maturing boys, owing to their obvious physical maturity are often accepted by, and associate with, older males—leading them to more risk taking and more externalizing problems such as aggression and delinquent behavior (Ge et al., 2001, 2003). Moreover, these boys are more likely to experience depressive symptoms during adolescence, but these symptoms decrease after several years. Too many temptations before they are ready to evaluate the risks associated with these more mature activities can lead to trouble and elevated sadness for early maturing boys.

For girls, the effects of early maturing are more negative, dramatic, and long lasting. Early maturing girls may not be as prepared for the changes in their bodies and body functions as girls reaching puberty on time because their development typically occurs before schools offer health classes and their mothers are less likely to discuss these changes with them (Brooks-Gunn, 1988; Mendle et al., 2007). They tend to have a poorer body image than on-time or late maturers, in part because the weight gains accompanying the onset of maturation violate the cultural ideal of thinness for girls (Graber et al., 1996; Mendle et al., 2007). As you can see from Figure 5-18, the trends for positive body image for girls and boys are almost opposites: Early maturing boys have a far more positive body image than late maturing boys; early maturing girls tend to have negative body images, whereas late maturing girls have positive self-images. Notice, however, that like boys who mature late, the latest maturing girls also tend to have some problems with body image. Early maturing girls have been found to have more adjustment or behavioral problems, including higher and more sustained levels of depression (Ge et al., 2001; Mendle et al., 2007), higher levels of eating disorders such as bulimia nervosa (Kaltiala-Heino et al., 2001), earlier initiation of substance use such as smoking and drinking (Stice et al., 2001), poorer academic achievement (Stattin & Magnusson,1990), earlier initiation of sexual activity (Stice et al., 2001; Stattin & Magnusson,1990), and higher rates of delinquent behavior (Haynie, 2003). Longitudinal studies in Sweden (Magnusson, 1988, 1996; Stattin & Magnusson, 1990; Stice et al., 2000) suggest the causes of these patterns. Early maturing girls had smaller networks of close friends and were more
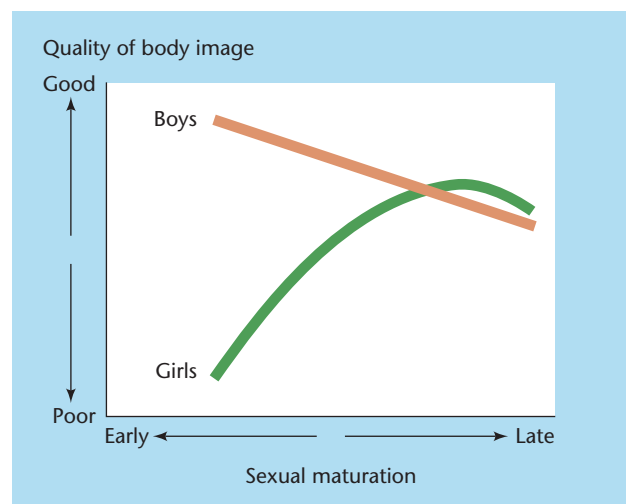
Figure 5-18

Body image in adolescent girls and boys

For boys, the relation between body image and timing of puberty is a straight line: the sooner, the better. Girls tend to have more positive body images the later they mature, but if maturity comes exceedingly late, their body images may suffer.

Source: Tobin-Richards, Boxer, & Petersen, 1983.

Making the Connections 5

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 5 and discussions in other chapters of this book.

Chapter 5
The Child's Growth: Brain, Body, Motor Skills, and Sexual Maturation

Height and weight are genetically influenced.
In Chapter 2, "Heredity and the Environment," p. 62

Hemispheric specialization is linked with processing of emotional information.
In Chapter 6, "Emotional Development and Attachment," p. 181

Childhood obesity is linked with poor peer relationships.
In Chapter 12, "Expanding the Social World: Peers and Friends," p. 448

likely to engage in adult behaviors such as smoking, drinking, and sexual intercourse at a younger age than late maturers because they tended to associate with older peers who are closer to them in terms of physical status and appearance.

Of course, although early maturation entails risks, not all early maturers have a poor body image or date, smoke, or drink earlier. Individuals differ in whether they perceive early maturation as "on time" (normal) or "off time" (deviant) depending on the attitudes, beliefs, and behaviors of their particular reference group. In the final analysis, a girl's adjustment to the changes of puberty probably depends more on the kinds of support, encouragement, and guidance she receives from parents, and the values and expectations of her own particular peer group, than on whether maturation is early, average, or late (Conger & Petersen, 1984).

The impact of the transition to sexual maturity cannot be fully appreciated in isolation from other changes in young people's lives. Some adolescents attend junior high school after sixth grade, whereas others stay in elementary school through eighth grade and then go on to high school. Researchers have found that youth moving through the former type of system experience more adjustment difficulties (Rudolph et al., 2001; Wigfield et al., 2006). In addition, some adolescents date early and others delay this step. Simmons and Blyth (1987) found that girls who entered puberty early and at the same time changed schools and started to date had lower self-esteem than other girls. Girls who moved their residences or experienced a major family disruption (divorce, death, remarriage) suffered even more loss in self-esteem and grades, and their participation in extracurricular activities decreased (Simmons et al., 1987). Attending a coed school also increases problems for early maturing girls (Caspi et al., 1993; Ge et al., 1996).

The challenges of coping with multiple and simultaneous life changes are not limited to girls. Boys who experienced sexual maturity accompanied by a variety of other changes, such as change of school, moving to a new neighborhood, or engaging in early dating, had poorer grades and participated less in extracurricular activities than boys who experienced fewer life transitions (Mendle et al., 2007; Simmons et al., 1987). These findings underscore the idea that the impact of the timing of puberty can best be understood in the context of other transitions and illustrate the ability of the environmental context to help or hinder children's abilities to cope with biological change.

SUMMARY

Brain Development in Infancy

- The largest portion of the human brain, the **cerebrum**, is covered by a highly convoluted layer called the **cerebral cortex**. The cortex is divided into a number of regions whose cells control specific functions such as seeing, hearing, feeling, moving, and thinking. In the developing organism, **neuron proliferation** rapidly increases the number of the brain's nerve cells, or **neurons**. Although most of the brain's neurons are present at birth, many subsequent changes take place in their sizes, the numbers of connections, or **synapses**, among them, and the production of the surrounding, supportive **glial cells**. These changes, such as **myelination**, increase the speed, efficiency, and complexity of transmissions between neurons.

- **Neural migration** distributes neurons throughout brain regions. The abundance of synapses, formed by **synaptogenesis**, and of neurons is trimmed over time through **neuronal death** and **synaptic pruning**.

- The human brain is organized in two halves: The two **brain hemispheres** are connected by the **corpus callosum**. The right hemisphere controls the left side of the body and is involved in the processing of visual-spatial information, face recognition, and interpreting emotional expressions. The left hemisphere controls the right side of the body and is important for understanding and using language. Both **hemispheric specialization** and **lateralization** are evident early in infancy and are well developed by age 3.

- **Dyslexia**, or difficulty in learning to read, may reflect abnormal lateralization patterns, such as the processing of spatial information on both sides of the brain rather than primarily in the right hemisphere, the normal arrangement.

- The environment plays a critical role in brain development. In rats, enriched environments that permit a great deal of activity and exploration are related to increases in brain size, in the number of connections among neurons, and in the activities of key brain chemicals. Apparently, the brain has great **plasticity**, which allows it to compensate for defects or damage in one area or even one hemisphere.

- The development of the child's brain is influenced by two types of experience. **Experience-expectant processes** are universal, shared by all human beings across evolution, such as the touch of another person or the sound of voice and speech. **Experience-dependent processes** are those that a person encounters in his own particular family or culture; for example, a child in Mozambique may learn to fish, whereas a U.S. child will learn to surf the Internet. These different activities promote the development of different parts of the brain.

Motor Development

- Research suggests that infants grasp objects in a variety of different ways depending on the object. Research based on dynamic systems theory has shown that patterns of specific reaching and grasping behavior reflect both coordination tendencies in an infant's general, nonreaching arm movements and environmental influences such as task requirements.

- The development of walking follows a U-shaped course, beginning with a stepping reflex at birth that disappears after a few months, followed by the emergence of independent, voluntary walking a number of months later, usually around the first birthday.

- A dynamic systems approach to explain this pattern suggests that the development of walking depends on the combined readiness of a variety of factors, and when the baby's weight becomes too much of a load on the emerging motor system, stepping ability may be temporarily masked. Cross-cultural studies indicate that environmental influences, such as repeated practice of a skill, may either enhance or slow a complex motor skill such as independent walking.

- The relations among locomotion; other aspects of development, such as perception, social interaction, and problem solving; and environmental forces are complex. In general, the greater a child's motor skills, the more his general development is enhanced; at the same time, negative factors such as conflicted child-parent relations may sometimes promote developmental skills such as walking.

Physical Growth

- Infants' and children's growth is guided by the two basic principles of cephalocaudal development and proximal-distal development, discussed in Chapter 3. Growth proceeds at different rates during different stages of development and is fastest during the first 6 months of life.

- Adult height is difficult to predict from a baby's size, which tends to be more closely related to the size of the mother. Successful predictions can be made in later childhood based on the child's height, gender, and parents' heights.

- Most authorities agree today that breast-feeding provides infants with better support for healthy growth than bottle-feeding. Breast-feeding ensures healthy development of the brain and nervous system; it strengthens the infant's immune system and protects against infectious diseases; and it helps build denser bones. Bottle-feeding is especially risky in developing countries, where the cost of formula is so high that women often dilute it with water that may not be clean.

- Inadequate nutrition may result in severely depressed growth rates. During World Wars I and II, height, weight, and age of puberty were affected by lack of adequate nutrition. Other environmental factors that may affect growth rates include illness, disease, and climate.

- Environmental influences such as nutrition and housing interact with other factors to produce a considerable variation in growth rates among people of different nationalities, ethnicities, and socioeconomic classes. The effects of poverty may be seen in such disorders as **iron-deficiency anemia**, common among minority children and children in low-income countries.

- Following environmental injury or deprivation, a strong corrective principle appears to operate in the case of physical growth. The degree of **catch-up growth** will depend on the duration, severity, and timing of the deprivation, in addition to the nature of the subsequent treatment or therapy. In general, the earlier and more prolonged the malnutrition, the more difficult it is to regain a normal level of growth.

- **Secular trends** in many countries show that people have become taller over time. Although in the United States people in the most advantaged groups may have reached their maximum potential in height gain, people in other segments of society continue to grow taller; both genetic and environmental factors influence this tendency.

- Although the problem of **obesity** may begin in infancy and childhood, only about one quarter of obese infants will remain obese 20 years later. The two critical periods for the development of obesity are during infancy and at about 4 years of age. Recent research indicates that genetic factors may play a role in determining later obesity; however,

parents' strategies for getting their children to eat may contribute as well.

- In addition to physical problems, such as hypertension and diabetes, obese children and adolescents may experience body-image disturbances and may suffer discrimination by peers and adults. Effective diet programs for children focus on changing the eating patterns and exercise behaviors of both the child and other family members.

- Eating disorders include **anorexia nervosa**, which may occur early in adolescence and results from reduced intake of calories, and **bulimia nervosa**, which typically occurs in later adolescence and is characterized by food binges and purging through vomiting.

Sexual Maturation

- **Puberty**, the onset of sexual maturity, is triggered when the **pituitary gland** stimulates other endocrine glands to secrete **hormones**, including **estrogens** and **progesterone** in females and **testosterone** in males, that initiate a growth spurt. This milestone in growth is marked by changes such as the start of breast development and **menarche** in girls and the enlargement of the testes and **spermarche** in boys. Girls tend to reach menarche earlier in the more advanced countries, but there is still considerable variation in the onset of menstruation throughout the world.

- Inheritance is a strong factor in the timing of menarche, although environmental conditions such as conflict within the family and the absence of the father may also exert an influence on when a young girl reaches menarche.

- The timing of physical maturation can affect the child's social and emotional adjustment. Research indicates that the effects for late maturing boys and early maturing girls are largely negative. In general, the impact of the timing of puberty is best understood in the context of other transitions, such as school transitions and family disruptions, which may help or hinder the child's ability to cope with biological changes.

- There are wide individual differences in rates of maturation. However, in general, girls mature earlier than boys; on average, major changes occur 2 years earlier for girls. Although early maturation is usually seen as advantageous for boys, girls sometimes find early maturation stressful, developing poor body images and engaging in so-called adult behaviors such as drinking and smoking at an early age.

EXPLORE AND DISCUSS

1. The development of the brain can be modified by environmental factors that range from useful stimulation to the extreme deprivation often suffered by children reared in orphanages. What implications does this plasticity of the brain have for the heredity-environment debate?

2. Motor development is influenced by a variety of factors. What role may culture play in the timing of children's walking? Discuss the proposition that some cultures are more skilled in certain motor areas than others.

3. Children and adolescents are becoming increasingly obese. What factors do you think account for this alarming trend?

4. Why do you think young people are reaching sexual maturity at earlier ages than in the past?

Martha Walter (1875–1976). *California Indian Child*, c. 1920.

David David Gallery, Philadelphia.

6.

Emotional Development and Attachment

Children display a wide range of emotions from the time they are infants. Babies communicate their feelings, needs, and desires to others through the expression of emotion. The smiling infant tells others that something is pleasurable to him, and his frown communicates displeasure. Babies also influence the behavior of other people by their expression of emotions. When a baby smiles, for instance, caregivers are almost sure to approach her, pick her up, talk to her, caress her; when a stranger approaches, on the other hand, her screams are apt to stop the stranger from picking her up. The older child may use smiling as a sign of welcome and express anger as a way of deterring a potential aggressor. In addition to using their own emotions to communicate with and regulate their worlds, children learn to read the emotional signs that other people display. Both processes—the production and the recognition of emotion—are essential to useful interactions with other people, and they enable babies to begin to exert some control over their social world.

We begin this chapter by examining why emotions are important and a variety of theories that help explain emotional development. Next we explore children's earliest expressions of emotion by examining several of the earliest emotional expressions—smiling, laughter, fear, anger, and sadness—in some detail. Then we look at the development of some of the later-developing emotions such as pride, shame, guilt, and jealousy. Then we explore how infants and children learn to recognize emotions in others. Next we discuss how children learn to regulate their emotions and how children think about emotions as they learn to match emotions to situations and begin to develop an awareness of their ability to experience more than one emotion at a time. Concluding our discussion of emotion, we explore how the family contributes to the socialization of different aspects of emotional development.

We then turn to the study of attachment, first reviewing several theories of how attachment relationships form and then tracing the evolution of these relationships between infants and parents, siblings, and others.

In the last section of the chapter, we explore the nature and quality of attachment relationships, considering such issues as the role of parenting styles in these relationships and the effects of attachment quality on the child's cognitive and social development as well as on her sense of self. We conclude by examining the important question of the effects of child care and multiple caregivers on the children of working parents.

EARLY EMOTIONAL DEVELOPMENT

emotions Subjective reactions to the environment that are usually experienced cognitively as either pleasant or unpleasant, generally accompanied by physiological arousal, and often expressed in some visible form of behavior.

What are **emotions**? Emotions, such as joy, anger, and fear, have several important aspects: They are (a) subjective reactions to the environment, (b) usually experienced cognitively as either pleasant or unpleasant, (c) generally accompanied by some form of physiological arousal, and (d) often communicated to others by some behavior or action. Thus, for example, Becky, the family's newest member, may react to the taste of a different formula with disgust, experiencing it as unpleasant, and if we were to measure her heart rate, we might find it had accelerated. Moreover, because Becky has not yet learned to hide her emotions, as adults sometimes do, she would doubtlessly let her family know in no uncertain terms of her displeasure. Watching her wrinkle up her face, spit up, and cry, Becky's parents could be pretty certain of the source of her unhappiness.

Why Are Emotions Important?

Emotions have a wide variety of functions in the lives of children. First, as we just noted, emotions are means of letting others know how we feel. Second, our success in communicating our emotions and in learning to interpret other people's emotions is linked with our social success. Being able to express and interpret emotions is just as important as being able to solve a cognitive problem. Just as we have intellectual or cognitive intelligence, we develop emotional intelligence as well. As Daniel Goleman, in his popular book *Emotional Intelligence* (1995), has documented, being able to navigate successfully in the world of your own and other people's emotions is a critical ingredient of social and occupational success.

Emotions are linked to children's mental and physical health as well. As we explore in greater detail in the chapter on psychopathology, children who become excessively sad and despondent may develop other problems such as poor concentration and withdrawal from social interaction with others. In extreme cases, such children's self-worth may deteriorate seriously. Physical health suffers, too, when emotional development goes wrong. Children reared in environments in which they are emotionally and socially deprived, such as orphanages, often develop later problems with the management of stress and anxiety. The fact that these children have more difficulty modulating their reactions to stress is revealed by heightened levels of *cortisol* (a biological marker of stress response) that, in turn, may lead to problems of physical health (Gunnar, 2000; Rutter, 2002). Even children reared in ostensibly normal homes may suffer impaired physical health when they are exposed to emotional hostility between their parents (Gottman et al., 1996). Clearly, emotions have a wide range of effects on children's development.

Primary and Secondary Emotions

It is useful to distinguish between primary and secondary emotions. Primary emotions—such as fear, joy, disgust, surprise, sadness, and interest—emerge early in life and do not require introspection or self-reflection. Another set of emotions, the second-

ary, or self-conscious, emotions—such as pride, shame, guilt, jealousy, and embarrassment—emerge later in development and depend on our sense of self and our awareness of other individuals' reactions to our actions (Lewis, 1998; Saarni et al., 2006). We consider primary emotions first, and then we explore secondary emotions.

Perspectives on Emotional Development

A child's emotional development is influenced by many factors: her genetic inheritance, the conditions of the environment into which she is born, her interactions with family members and, later, with peers. These and other factors all play important roles in determining her emotional makeup. In this section, we examine three theoretical perspectives on emotional development: the genetic-maturational, learning, and functionalist perspectives. Each of these three perspectives may be useful in explaining certain aspects of the child's development at certain stages of life. And as you will see, all views overlap to some degree.

THE GENETIC-MATURATIONAL PERSPECTIVE According to the genetic-maturational view, emotions are best seen as products of biological factors. Individual differences in temperament play a central role in how intensely children react to emotionally arousing situations and in how well they are able to regulate their reactions. And right- and left-brain hemispheres control joy and fear expressions, respectively (see Chapter 2). Twin studies and research with premature infants support the biological underpinnings for the development of emotions. Identical twins show greater similarity than fraternal twins in both the earliest times of their first smiles and the amount of smiling in which each engages (Plomin et al., 1997). Studies of smiling in premature infants support the role of genetic-maturational factors in the onset of smiling. The normal *conceptual age* (age since conception) of a newborn human is 40 weeks, and most full-term babies begin to smile about 6 weeks after they are born, or at a conceptual age of 46 weeks. Premature infants who are born at 34 weeks often do not smile until 12 weeks after birth, which for them is also 46 weeks since conception (Dittrichova, 1969). A certain amount of physical maturation and social stimulation must occur before a baby is ready to start smiling. The interplay between genetics and the environment accounts for the timing and form of the behavior.

A genetic-maturational basis for negative emotions, such as fear, is also supported by twin studies. Again, identical twins are more similar than fraternal twins in their fear reactions to strangers and in their general degree of inhibitedness (Plomin et al., 1997; Robinson et al., 1992; Rutter, 2006).

THE LEARNING PERSPECTIVE The learning perspective is particularly useful in explaining individual differences in emotional expression. In general, different emotional expressions have different onsets, frequencies, and intensities in different children. The frequency with which children smile and laugh seems to vary with the nature of the environment in which they are raised (Denham et al., 2007). Parents can help their children learn to manage and understand their emotions by rewarding only certain emotional displays. Or they can interfere by being punitive and by dismissing their children's emotional expressions and experiences (Gottman et al., 1996). Common sense suggests that parents who respond with enthusiasm to their smiling infant will tend to encourage him to smile more. This has in fact been verified in studies showing that when adults, particularly familiar caregivers, respond to a baby's smile with positive stimulation, the child's rate of smiling increases (Denham et al., 2007; Rovee-Collier, 1987).

Learning experiences can also elicit and reinforce fear responses. Recall our example, in Chapter 4, of how a child may become classically conditioned to fear the doctor who gave him a painful shot on his first visit. Children may learn other fears through

operant conditioning when one of their own behaviors, such as climbing up a high ladder, is followed by a punishing consequence, such as a painful fall. And they can learn still other fears simply by observing others. For example, a child may watch her mother react fearfully to a bee or to a large dog and later imitate her mother's reaction (Bandura, 1989; Denham et al., 2007). In all these cases, the child's particular set of fears depends on what she has learned.

THE FUNCTIONALIST PERSPECTIVE   The functionalist perspective is a contemporary approach to emotional development (Saarni et al., 2006). According to this theory, emotions serve to help us achieve our goals and adapt to our environment, and it emphasizes the role of emotions in establishing and maintaining social relationships as well as the role that social cues play in regulating our emotional perceptions and expressions. This approach incorporates many features of the learning perspective in a unified view of emotional development.

How does this perspective approach emotional development? It assumes that the purpose of emotion is to help us achieve our goals. We all have goals that we try to reach—for example, to make a new friend or to stay out of danger. And goals arouse emotions: Joy and hope arise as we anticipate forming a new friendship; fear may engulf us in a scary situation. In both cases, the emotions aroused help us reach our goals. The emotion of fear may lead us to flee the dangerous situation, enabling us to achieve the goal of self-preservation.

The functional approach also recognizes the social nature of emotions. We use information provided by others' emotional signals to guide our own behavior. For instance, the way someone you view as a potential friend reacts emotionally to your social overture will be a critical determinant of how you feel. If she responds positively and smiles, you'll be happy and carry on, but if she frowns, you'll probably not be pleased and will try to make friends with someone else. So you evaluate the situation and use the feedback from others as a guide. Finally, memories of the past serve as a guide in shaping how the child will respond emotionally to a situation. Children who have routinely been rebuffed by potential friends will be more wary, whereas children who have been socially successful will be more confident in this situation. In both cases, emotions regulate children's behavior and enhance their adaptation to their environment.

No one theoretical perspective alone is likely to integrate all aspects of emotional development. Instead, different theories are useful in answering different questions. Emotional responses are shaped by a complex interplay between biological factors and the many forces of the environment that the child experiences. As we look at different aspects of emotional development, we will consider how each of the three perspectives we have examined helps us understand issues of emotional development.

The Development of Emotional Expressions

Most parents pay a great deal of attention to their newborn infants' behaviors and activities, and witnessing displays, such as smiling, frowning, and laughing many times over, they are inclined to agree that infants display a wide range of emotions at a very early age. Ninety-nine percent of mothers said that their 1-month-olds clearly displayed interest; 95% of mothers observed joy; 85%, anger; 74%, surprise; 58%, fear; and 34%, sadness (Johnson et al., 1982). These women based their judgments not only on their babies' behavior (facial expressions, vocalizations, body movements) but also on the nature of the situations in which those behaviors occurred. For example, a mother who watched her baby staring intently at the mobile above her crib was likely to label the infant's emotion "interest," whereas she might call the emotion expressed by a gurgling, smiling baby "joy." As you continue through this chapter, you may find it useful to refer to the Turning Points chart (pp. 184–185), which offers a brief chronology of the milestones of emotional development in a typical child.

But relying on mothers' judgments may not be the best way to approach the issue. If you are wondering how researchers can distinguish among infants' expressions of all these emotions, the answer is by means of coding systems that pay careful attention to changes in a baby's facial expressions and bodily movements. These systems assign finely differentiated scores to different parts of the face (e.g., lips, eyelids, forehead) and to specific infant movement patterns. Researchers then use these scores to judge whether an infant has displayed a particular emotion (e.g., Izard et al., 1995). Izard and his associates (e.g., Izard et al., 1995) have developed the most elaborate of the coding systems for infant emotional expressions now in use, the Maximally Discriminative Facial Movement, or MAX, coding system.

DEVELOPMENT OF PRIMARY EMOTIONS

With this general overview of early emotional development as a guide, let's turn to the development of the primary emotions of smiling, laughter, fear, anger, and sadness.

Positive Primary Emotions: Smiling and Laughter

At age 6 months, Liah smiled widely whenever her mother reached down to pick her up; by 12 months, Liah was laughing and giggling every time she and her dad played peeka-boo. What events elicit the smiling and laughter, and what is the developmental course of joy and pleasure? As we have already noted, if you watch closely, you can see smiles even in newborn infants. These **reflex or simple smiles** (Fogel et al., 2006; Wolff, 1987) are usually spontaneous and appear to depend on the infant's internal state, but the exact nature of the internal stimulus is as yet unknown. Whether or not researchers can shed light on the origin of the baby's reflex smiles, these smiles serve a good purpose. Most caregivers interpret these smiles as signs of pleasure, and this gives the caregivers pleasure and encourages them to cuddle and talk to the baby. In this sense, these smiles may have adaptive value for the baby, ensuring critical caregiver attention and stimulation. Overall, early as well as later smiling helps keep caregivers nearby and thus becomes a means of communication and an aid to survival (Saarni et al., 2006).

Between 3 and 8 weeks of age, infants begin to smile in response not only to internal events but also to a wide range of external elicitors, including social stimuli such as faces, voices, light touches, and gentle bouncing (Sroufe, 1996). Infants are particularly interested in people and faces, and a high-pitched human voice or a combination of voice and face are reliable smile elicitors for babies between 2 and 6 months old. When 3-month-old infants were shown a human face and puppets whose faces varied in their resemblance to a human face, the infants smiled almost exclusively at the human face (Ellsworth et al., 1993). Babies aren't such gullible little creatures; they know the "real thing" when they see it!

As infants grow older, they tend to smile at different aspects of the human face (Saarni et al., 2006). As we saw in Chapter 4 (see Figure 4-6), when 4-week-old babies look at human faces, they tend to focus on the eyes, but by the time they're 8 or 9 weeks old, they examine the mouth as well. Smiling behavior follows a similar pattern: At first, babies smile at the eyes, then the mouth, and finally the entire face and the facial expression. By the time they are about 3 months old, babies also start to smile more selectively at familiar faces (Camras et al., 1991; Saarni et al., 2006), a fact that lends some support to the notion that smiling has begun to signal pleasure and not just arousal. For example, 3-month-olds show greater increases in smiling when their smiles are reinforced by reciprocal smiles and vocalizations from their mothers than when they are reinforced by equally responsive women who are strangers (Wahler, 1967). These

reflex smile A smile seen in the newborn that is usually spontaneous and appears to depend on some internal stimulus rather than on something external such as another person's behavior.

Turning Points

THE EVOLUTION OF EMOTIONAL EXPRESSION AND THE SENSE OF SELF

EARLY WEEKS	Shows distress by crying
1 MONTH	Generalized distress; may be irritable by late afternoon
2 MONTHS	Shows pleasure; mildly aroused by sight of toy; social smile
3 MONTHS	Excitement and boredom appear; smiles broadly and often; cries when bored; may show wariness and frustration
4 MONTHS	Laughs, especially at certain sounds; crying lessens; gurgles with pleasure; shows beginnings of anger
5 MONTHS	Usually gleeful and pleased but sometimes frustrated; shows primitive resistant behaviors; turns head from disliked food; smiles at own image in mirror; some babies may begin to show wariness of strangers
6 MONTHS	Matches emotions to others, e.g., smiles and laughs when mother does; fear and anger may appear now or later
7 MONTHS	Fear and anger; defiance; affection; shyness
8 MONTHS	More individuality in emotional expression
9 MONTHS	Shows negative emotions when restrained; frowns when annoyed; actively seeks others' comfort when tired; nighttime crying may reappear; recognizes self in mirror; most babies display real fear of strangers
10 MONTHS	Intense positive and negative emotions; occasionally testy; uses reflection in mirror—e.g., seeing toy in mirror, may move toward toy
11 MONTHS	Greater variability in emotions; individual temperament is more evident; learning to associate names of body parts; may insist on feeding self
12 MONTHS	Becomes distressed when others are distressed; cries when something is not to liking; may show signs of jealousy; laughs often at own cleverness; struts/preens when walking; loves to look at self in mirror; wants to show mastery, and plays on own

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental changes.

Sources: Kopp, 1994; Saarni, et al, 2006; Sroufe, 1996.

findings are consistent with the learning and functionalist perspectives and suggest that infant smiling becomes more discriminating as babies develop.

A baby's pleasure at watching a familiar face is revealed in other ways as well. For instance, one study found that 10-month-olds generally reserved a special kind of smile for their mothers, rarely offering it to strangers (Fox & Davidson, 1988). These special smiles (called *Duchenne smiles* after Guillaume Duchenne, the French physician who noticed this pattern more than 100 years ago) are likely to involve not just an upturned mouth but wrinkles around the eyes as well, making the whole face seem to light up

15 MONTHS	More mood swings; is more caring to age-mates; annoyed by dirty hands; strongly prefers certain clothing; may fret or cry often but usually briefly
18 MONTHS	Can be restless and stubborn; may sometimes have tantrums; sometimes shy; shows shame; uses adjectives to refer to self; uses objects like a blanket or a favorite stuffed animal to soothe self
21 MONTHS	Makes some efforts to control negative emotions; can be finicky and exacting; makes more efforts to control situations; begins to understand parents' values; refers appropriately to self as good or bad
24 MONTHS	Can be contrary but also appropriately contrite; responds to others' moods; very intense; may be overwhelmed by changes; can be upset by dreams; refers to self by name; identifies self by gender; talks about self by using I and a verb, such as hurt or need; keen to experience world on own terms; begins to understand emotional display rules
30 MONTHS	Begins to show shame, embarrassment
36 MONTHS	Shows pride, guilt
48 to 60 MONTHS	Shows increased understanding and use of emotional display rules
72 MONTHS	Begins to understand how two or more emotions can occur simultaneously

with pleasure (Ekman, 2003; Ekman et al., 1990). Finally, babies display genuine smiles more in interacting with caregivers than when smiling alone (Messinger et al., 2001). And babies show other kinds of smiles during play—the display smile—which is a combination of the Duchenne smile and a jaw drop. This is evident in later phases of tickle games and peekaboo where there has been a buildup of excitement, followed by completion of the play bout (Fogel et al., 2006).

Of course, not all babies smile with equal frequency at their caregivers: There are individual differences in the amount of smiling a baby does. Some of these differences have to do with the social responsiveness of the baby's environment. For example, Israeli infants reared in a family environment smiled more often by the second half year than infants raised in either a kibbutz (a communal living arrangement—see Styles of

Caregiving in the section on attachment later in this chapter) or an institution, where the level of social stimulation is presumably lower (Gewirtz, 1967). Gender is related to babies' smiling: In the newborn period, at least, girls generally show more spontaneous smiles than boys do (Korner, 1974). Nor are gender differences in smiling restricted to infants; teenage girls smile more than teenage boys (La France et al., 2003). This higher rate of smiling has led some observers to suggest that girls may be genetically better prepared for social interaction than boys because their greater tendency to smile more often draws others to them (Saarni et al., 2006). This view supports the genetic-maturational perspective. On the other hand, parents generally elicit and expect more emotions from girls than boys, which suggests that both genetic and environmental factors need to be considered.

There are national, ethnic and gender differences in smiling (La France et al., 2003). Compared with their peers in Great Britain, children and adults in the United States and Canada show larger gender differences in smiling. Perhaps Europeans have less stereo-typed views of gender differences and treat boys and girls more similarly than do North Americans. And European American males and females differ more in their smiling rates than do African Americans, among whom males and females show smaller differences in their smiling behavior. This ethnicity difference is consistent with the finding that African American parents treat boys and girls more similarly than European American parents do (see Chapter 13).

Laughing, at which infants become quite skilled by the time they're 4 months old (Sroufe, 1996), is if anything even more useful in maintaining the baby's well-being (Nwokah et al., 1994). If smiling gradually becomes a sign of pleasure, laughter leaves us with little doubt of a baby's positive emotion, and it plays a very important role in caregiver-infant interaction.

What sorts of events elicit laughter across the first year of life? Sroufe and Wunsch (1972), using mothers as their experimental assistants, examined the amount of laughter elicited in babies between 4 and 12 months of age by a wide array of visual, tactile, auditory, and social-behavioral stimuli—for example, a human mask or a disappearing object; bouncing the child on an adult's knee or blowing on the baby's hair; making lip-popping, whispering, or whinnying sounds; and playing peekaboo, covering the baby's face, or sticking out the tongue.

As Figure 6-1 shows, up to about 7 months of age, babies are increasingly likely to laugh at visual, tactile, and social events, but their reactions to auditory stimulation remain stable. Note, however, that the nature of the stimuli that elicit laughter changes as the child develops. From 7 months on, both social and tactile stimuli begin to be less effective, but response to visual stimuli continues to increase. Toward the end of the first year, babies respond more to social games, visual displays, and other activities in

Figure 6-1

What makes children laugh?

Between the ages of 4 months and a year, children were most consistently likely to laugh at visual and social stimuli, such as a disappearing object or playing peekaboo.

Source: From Sroufe & Wunsch, 1972.
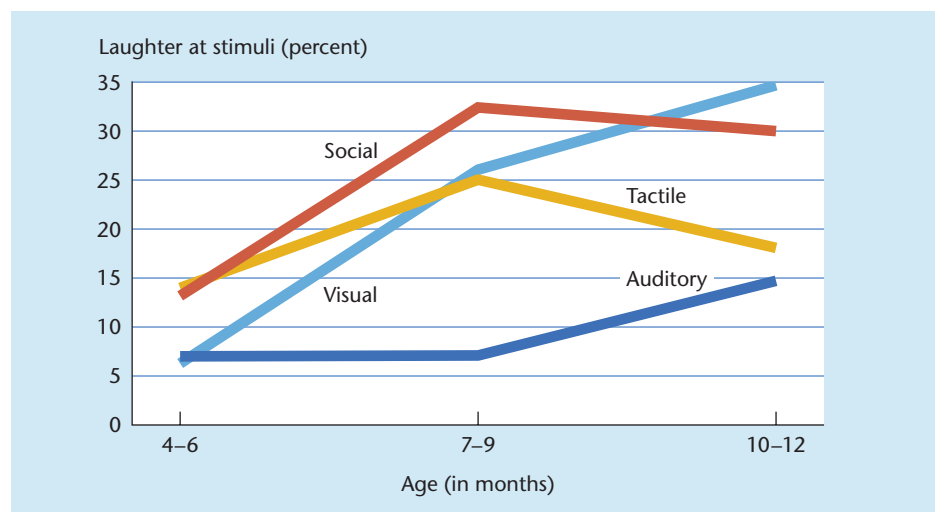
which they can participate, such as covering and uncovering the mother's face with a cloth or playing tug-of-war with a blanket. By the end of the first year and throughout the second year, infants increasingly smile and laugh in response to activities that they create themselves (Sroufe, 1996), such as practicing their motor accomplishments by pulling themselves to a standing position or laughing after making a jack-in-the-box pop up. As children grow older, laughing increases and becomes more of a social event (La Freniere, 2000; Saarni et al., 2006). In one study of 3- to 5-year-olds, nearly 95% of laughter occurred in the presence of other children and adults (Bainum et al., 1984). Acting silly was most often the elicitor of laughter among the nursery school set.

Negative Primary Emotions: Fear, Anger, and Sadness

FEAR   Timothy, at the age of 8 months, is exploring some toys in his playpen. He looks up and sees a strange woman standing near, watching him. Timothy turns back to his toys briefly and then, again, solemnly looks at the stranger, whimpers, turns away, and begins to cry. In the continuing search for regularities in early development, few phenomena have captured as much time, effort, and interest as this type of exchange between an infant and a stranger. Apparently, at the same time that babies are beginning to display signs of positive emotion in smiles and laughter, they are also learning to be fearful of some events and people, especially unfamiliar ones (La Freniere, 2000; Saarni et al., 2006).

The negative emotional response called *fear of strangers* evolves more slowly than the positive emotional expressions we've just discussed. Sroufe (1996) distinguishes two phases in the emergence of fear. At about 3 months of age, Sroufe maintains, infants show *wariness*, in which they respond with distress to an event that includes both familiar and unfamiliar aspects and which they therefore cannot comprehend and assimilate. This argument is consistent with the cognitive perspective of emotional development. By the time they are 7 to 9 months old, babies show true *fear*, which is an immediate negative reaction to an event that has specific meaning for them, such as seeing the face of a total stranger (e.g., "I don't know what this is, and I don't like it").

Even at 4 months of age, babies smile less at unfamiliar adults than they do at their mothers, showing early signs that they recognize familiar people. But they are not yet distressed by the presence of a stranger. In fact, they show great interest in novel people as well as novel objects. Often, they look longer at a stranger than at a familiar person, and if the mother is present, they will frequently look back and forth between her face and the stranger's, as if comparing them. Then, at about 5 months of age, this earlier reaction of gaze and interest starts to be replaced largely by giving a stranger a sober stare. At 6 months, although babies still are most likely to react to strangers with a sober expression, they're also likely to display distress. A distress reaction then gradually increases in frequency over the next half year, and by 7 to 9 months, the earlier wary reactions give way to clear expressions of fear. Figure 6-2 summarizes this progression from interest and exploration to fear over the first year of life (Emde et al., 1976).

Fear of strangers, or **stranger distress**, has become enshrined in the psychological literature as a developmental milestone and at one time was thought to be both inevitable and universal. Researchers now know that it is neither (La Freniere, 2000; Saarni et al., 2006). Stranger distress emerges at about 7 to 9 months of age in several cultures, including the Hopi Indians (Dennis, 1940) and in Uganda (Ainsworth, 1963). However, in other cultures, such as the Efe (Africa), that

stranger distress A fear of strangers that typically emerges in infants around the age of 9 months.

Around the age of 7 to 9 months, children begin to experience fear, especially in response to unfamiliar people or events. This child clearly doesn't want the little dalmatian puppy anywhere near her.

Figure 6-2

The onset of stranger distress

At 8 months of age, half of the children studied were showing distress at the appearance of strangers, and within a month or 2, this distress reaction was clearly dominant.

Source: Adapted from Emde, Gaensbauer, & Harmon, 1976.
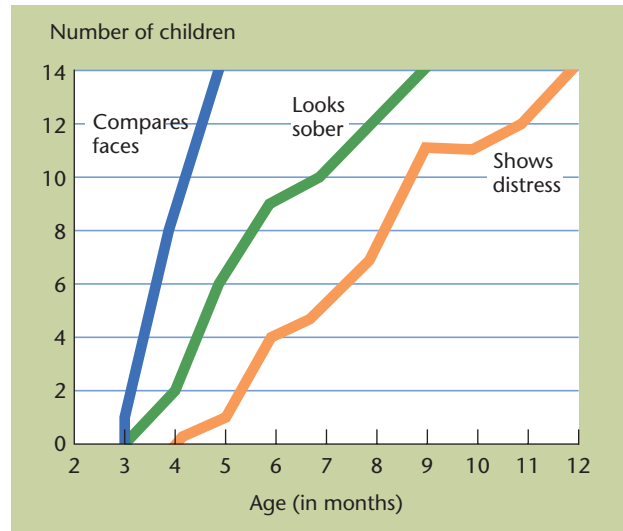
emphasize shared caregiving among relatives, babies show little stranger fear (Tronick et al., 1992). Moreover, babies are not all alike in their reactions to strangers. For some, greeting and smiling may be a frequent reaction, and fear is not typical, but others show fear (Rheingold & Eckerman, 1973).

Whether a baby is fearful of a stranger depends on a host of variables, including who the stranger is, how he or she behaves, the setting in which the person is encountered, and the child's age (Mangelsdorf et al., 1991; Saarni et al., 2006), as shown in Table 6-1. Consistent with the functionalist perspective on emotional development, contextual factors help determine the way an infant will react to a stranger. When babies meet strangers in their own homes, they show less stranger fear than when encountering unfamiliar people in an unfamiliar setting such as a researcher's laboratory (Sroufe et al., 1974). Similarly, babies who sit on their mothers' laps while a stranger approaches rarely show any fear, but when they're not in physical contact with their caregiver, they may show fear when a stranger approaches (Bohlin & Hagekull, 1993; Morgan & Ricciuti, 1969). And it depends on how the mother reacts to the stranger, too. When a baby sees his mother reacting positively to a stranger, he tends to follow suit and responds much more positively, smiling more, approaching the stranger, and offering his toys (Feinman & Lewis, 1983). Conversely, when the mother adopts a worried look in the presence of a stranger, her baby is apt to cry more and smile less (Boccia & Campos, 1989; Mumme et al., 1996).

social referencing The process of "reading" emotional cues in others to help determine how to act in an uncertain situation.

These studies illustrate **social referencing** in infants—that is, the process of "reading" emotional cues in other people to help determine how to act in an uncertain situation (Saarni et al., 2006). Much of this work has been stimulated by the functionalist

Table 6-1   Factors that alter infant fear of strangers

	More Fear	Less Fear
Context	Unfamiliar setting (e.g., lab)	Familiar setting (home)
	No physical contact with familiar figure; distant from mother or familiar person	Close physical proximity to familiar figure
	Sober or negative emotional reactions to stranger from familiar figure	Positive or encouraging reactions to stranger from familiar figure
Characteristics of stranger	Adult size and features	Child size and features
Behavior of stranger	Passive and exhibits sober expression	Active, friendly, smiling
Degree of control over strange person or object	Low control and unpredictability	High control and predictability
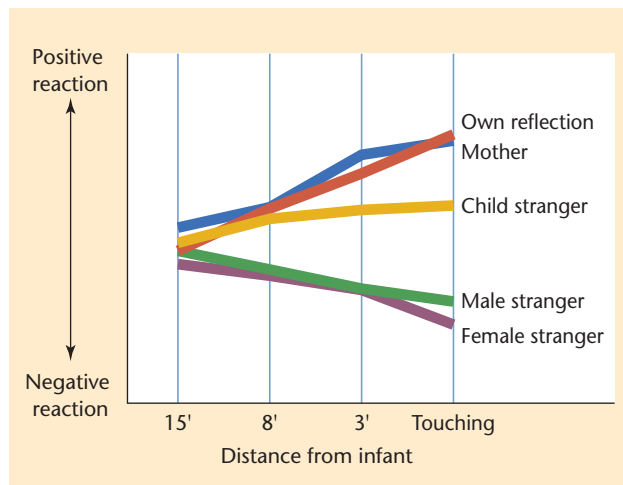
Figure 6-3

Proximity and age of a stranger affect babies' reactions

In this study of stranger distress, the gender of a stranger had no effect, but his or her age did. The infants did not perceive the 4-year-old stranger as threatening but reacted very negatively to both adults. Distance from the infants had relatively little effect on the way they perceived the young stranger, but the closer the adult strangers got, the more intensely the babies showed their distress. In comparison, the infants reacted quite positively both to their own reflections and to their mothers, and this tendency increased with proximity.

Source: Adapted from Lewis & Brooks, 1974.

perspective on emotional development. This social referencing undergoes clear changes over time (Walden, 1991). As infants develop, they are more likely to look at the mother's face than at other parts of her body. Babies between 14 and 22 months old were clearly more aware that their mother's face was the best source of information than were babies 6 to 9 months old (Walden, 1991). Infants grow also in their tendency to check with their mothers before they act. Younger infants often act first and look later, a strategy that could lead to trouble in a dangerous situation. The fact that even infants learn to use others' emotional expressions as a guide to their own actions underscores the importance of emotion for regulating social behavior (Saarni et al., 2006). Another contextual factor is the degree to which the situation allows the infant some control over the extent and pace of the interaction (Mangelsdorf et al., 1991). When babies could control the noise and movement of a toy monkey or the predictability of the noise (regular vs. erratic), 1-year-olds were less fearful (Gunnar, 1980; Gunnar et al., 1984). The characteristics of the stranger matters, too. Infants are less afraid of children than they are of adults, as Figure 6-3 indicates.

Perhaps if mom hadn't backed away to take a picture, this 1-year-old wouldn't have felt so threatened by Santa Claus.

Is it the size or facial features of the stranger that matter? When confronted with three strangers, an adult, an adult midget, and a child, the infants were more fearful of the adult midget than the child. Size is less important than faces, and babies react more negatively to adult faces than to a child's. Unfortunately, a "baby-faced adult" was not available to test this hypothesis. A stranger's behavior also affects the degree of stranger distress an infant displays (Mumme et al., 1996; Saarni et al., 2006). When confronted by an active, friendly stranger who talks, gestures, smiles, imitates the baby, and offers toys, most 12-month-olds show little fear. In contrast, infants are more apprehensive when confronted by a passive and sober-looking stranger.

Some kinds of fear do appear to be universal and are present in all cultures. A common fear in childhood is associated with being separated from one's mother or other familiar caregivers. This fear, called **separation protest**, tends to peak in Western infants at about 15 months and, as Figure 6-4 shows, displays a remarkably similar timetable in such diverse cultures as those of Guatemala and the Kalahari Desert region in Botswana. As we will see later in the chapter, separation protest also occurs in infants in child care when working parents drop them off at a child-care center. Although *separation anxiety*, as this fear is also called, generally becomes less and less common in childhood, it sometimes reappears in other forms: Box 6-1 describes a study of homesickness among children at camp and suggests some useful ways of coping with this kind of distress.

ANGER AND SADNESS   In early infancy, it's not clear that young infants' emotional expressions are the same as what seem to be analogous adult expressions or even that infants are expressing the same sets of feelings. For example, what looks like anger in a baby may actually represent a generalized state of distress (Camras et al., 1991; Saarni et al., 2006). Carroll Izard, a pioneer in the study of infant emotion, holds that newborns do express specific emotions (Izard, 1994; Izard et al., 1995). According to Izard, the first negative expressions to appear are *startle, disgust* (as in response to bitter tastes), and *distress* (in response to pain) that seems unrelated to external events. However, Izard proposes, not until babies are about 2.5 or 3 months old do they begin reliably to display facial expressions of anger, interest, surprise, and sadness (Izard et al., 1995). For example, although few 1-month-olds show anger expressions when their arms are gently restrained, by the time infants are 4 to 7 months old, some 56% show clear expressions of anger at this restriction (Stenberg & Campos, 1989). These kinds

separation protest An infant's distress reaction to being separated from his or her mother, which typically peaks at about 15 months of age.

Figure 6-4

Separation protest

Although children of four different cultures varied considerably in the intensity of their protest at their mothers' departures, they all tended to reach a peak of distress at about the same age, between 13 and 15 months.

Source: Reprinted by permission of the publisher from *Infancy: Its Place in Human Development* by Jerome Kagan, Richard B. Kearsley, and Philip R. Zelazo, p. 107, Cambridge, Mass.: Harvard University Press. Copyright © 1978 by the President and Fellows of Harvard College.
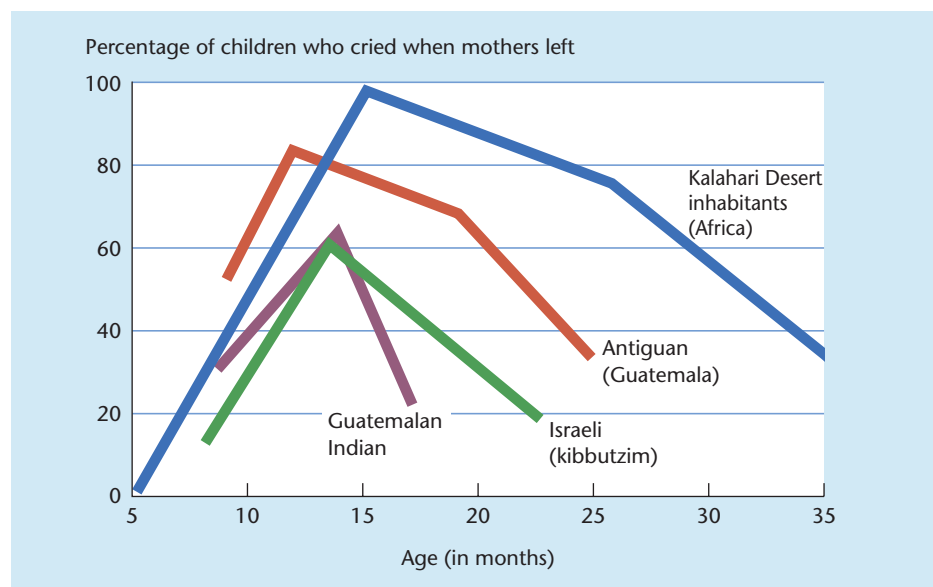
of early emotions are probably influenced at the outset by genetic-maturational factors. Over time, learning and functional perspectives come into play.

Not unlike adults, infants usually display anger in response to particular external events (Saarni et al., 2006; Sroufe, 1996). For example, researchers have evoked anger in 7-month-olds by offering them a teething biscuit and then withdrawing it just before it reaches the baby's mouth (Stenberg et al., 1983). Two-month-olds respond with a distress expression to being inoculated by a physician, whereas 6-month-old babies respond to the same stimulus with an expression of anger (Izard, Hembree, & Huebner, 1987). It seems that babies respond to emotional provocations in predictable ways at specific ages (Denham et al., 2007), and anger is elicited by pain and frustration.

Sadness, too, is a reaction to pain, hunger, or lack of control, but it occurs less often than anger. Babies become sad when there are breakdowns in parent-infant communication. For example, when a usually responsive caregiver ceases to respond to the babies' social overtures, the infant will exhibit distress and sadness (Tronick et al., 2005; Weinberg & Tronick, 1998). In older infants, separation from their mothers or other familiar caregivers can lead to sadness as well. We will explore this issue later in the chapter when we examine how infants develop an attachment bond to adults. Again, just as we saw with positive emotions, anger and sadness are effective emotional signals for eliciting care and comfort from adults and therefore serve an important evolutionary function that promotes the survival of the infant.

DEVELOPMENT OF SECONDARY EMOTIONS

The appropriate display of more complex emotions, such as pride, shame, guilt, and jealousy, requires the ability to differentiate and integrate the roles of multiple factors in a situation, including the role of personal responsibility. Often called secondary, or "self-conscious," emotions because they rely on the development of self-awareness, these emotions begin to emerge toward the middle of the second year (Saarni, 1999; Saarni et al., 2006; Tangney & Fischer, 1995). For example, children may show embarrassment by blushing and turning away, and they may express envy or jealousy by pouting when other children receive more desirable toys (Lewis, 1995; Lewis & Ramsey, 2002). When a child is pleased with her accomplishments, she shows pride, but when she perceives that someone finds her wanting or deficient—perhaps she has failed an easy task—she shows evidence of shame. The feeling of guilt, which requires the development of a sense of personal responsibility and the internalization of moral standards, emerges a bit later than pride and shame (Tangney, 1998).

PRIDE AND SHAME   Crucial to distinguishing between children's experiences of pride or shame is their emerging sense of the differences between "easy" and "difficult" and between "success" and "failure" (Lewis, 2000). Lewis and his colleagues (Lewis, 1992; Lewis et al., 1992) found that by the time they were 3 years old, children were more likely to express pride if they succeeded at difficult tasks than at easy ones. They also expressed more shame if they failed an easy task but expressed little if any shame if they failed a difficult task. Solving a problem that was not particularly difficult elicited joy in these youngsters, but succeeding on a difficult task produced pride. Failing a difficult task caused sadness, but failing an easy task aroused shame; see Figure 6-5 (Lewis et al., 1992).

Children's understanding of pride also depends on their ability to entertain multiple emotions—such as pleasure at doing a task well and happiness that others appreciate the accomplishment (Saarni et al., 2006)—and on their sense of personal agency, or effort. To evaluate

This adolescent is clearly proud and happy at winning a yellow ribbon in the Special Olympics.

BOX 6-1
Child Psychology in Action

COPING WITH HOMESICKNESS

Homesickness, which is common in the middle and later childhood years, usually arises when children are away from home for periods of more than a day. Summer camps, boarding schools, colleges, foster homes, and hospitals are among the sites in which researchers have studied homesickness in children (Thurber & Weisz, 1997). Homesickness, a longing to be with one's family or regular caregivers, may be expressed in depressive or anxious behavior; in acting out, as in aggressive behavior; or in complaints about physiological problems, such as headache, stomachache, and other pains of an ill-defined nature.

How do children cope with homesickness? According to Thurber and Weisz (1997), a child's beliefs about his ability to exert control over a situation strongly determine his choice of coping mechanism. If a child who is sent to live with relatives because of economic distress at home believes he can change his situation, he may exert primary control by running away from his aunt's house and returning to his own home. Often, however, a child is unable to change his situation or finds that attempts to do so are unsuccessful and lead only to feelings of helplessness and depression. In this event, a child may instead elect secondary control, changing himself or his behavior to adapt to the unwanted situation. Thus, a child placed in a boarding school many miles from home might write letters home every day to feel in touch with his family, or he might join spe-

cific activities in which he had participated at home. A third way of dealing with homesickness is to relinquish control, or to give up trying to change things and seek solace in expressing sadness through a means such as crying or withdrawing from others.

Because some stressors are controllable and others are not, coping is often a mix of primary and secondary measures with the child trying first one and then another. The choice of coping measure depends on specific constraints of the situation, such as camp rules, as well as on individual characteristics, such as age, perceived ability to control events, and cognitive sophistication.

To study homesickness, Thurber and Weisz (1997) chose two summer camps, one for girls and one for boys, and found that overall, both boys and girls tended to use secondary control methods to cope with homesickness, most often doing something that was fun to forget their negative feelings. Among these youngsters, who ranged in age between 8 and 16 but who were on average 12.5, the most homesick were those most likely to relinquish control, making little effort to cope with their unhappiness. On the other hand, the least homesick were those who appeared to know how to use different combinations of both primary and secondary methods to cope with their unpleasant feelings; this group was also the least likely to relinquish control.

Figure 6-5

Pride, shame, and task difficulty

The more difficult the task, the less shame children felt if they failed at it and the more pride they felt when they succeeded.

Source: Lewis et al., 1992.

Frequency of coping
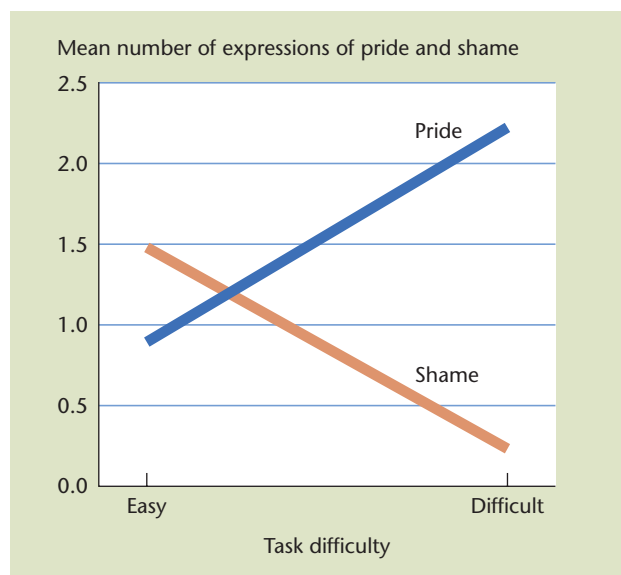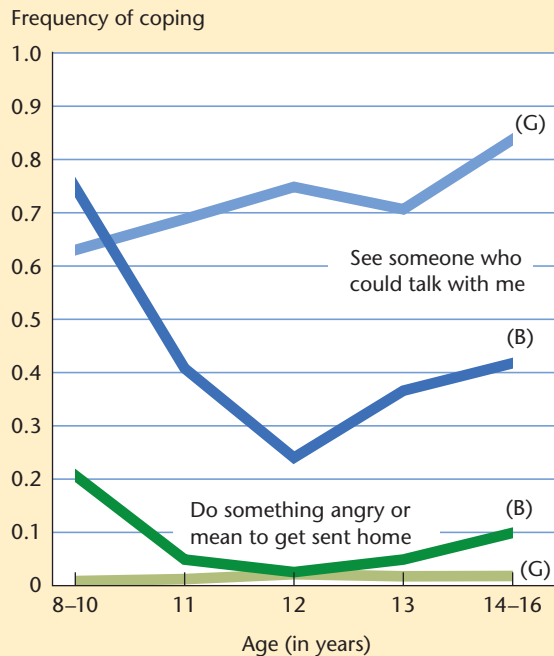
Figure 6-6

Coping with homesickness

When they were homesick at camp, both girls (G) and boys (B) preferred to talk with someone about it rather than act out in the hope of being sent home. However, this trend was much stronger in girls than boys.

Source: Adapted from Thurber & Weiss, 1997.

Girls were more likely to call upon specific coping devices than were boys. However, there was also a significant gender difference in respect to the use of the primary control device of seeking out "someone who could talk with me and help me feel better, like a leader or one of my friends." Although 8- to 10-year-old boys and girls differed little on this parameter, from 11 on, girls were far more likely than boys to use this social-support approach to solving the problem of homesickness (Figure 6-6). As we've suggested earlier in the book, and will discuss at greater length in Chapter 13, girls seem to be more socially oriented from early on.

Thurber and Weisz (1997) conclude that useful intervention in homesickness involves helping children to understand that being homesick isn't just an unhappy emotion but an emotional reaction to circumstances, some of which they can control and some of which they can't. It's important to help children distinguish these components of the problem and to help them develop specific coping methods at both the primary and secondary levels. Then one can show children how to apply each type for maximum benefit and help them understand why relinquishing control is not effective.

this understanding, Thompson (1989) told stories to 7-, 10-, and 18-year-olds involving accomplishments that individuals achieved either by their own efforts or by luck and then asked them questions about the stories. The 7-year-olds used the term *proud* in discussing good outcomes regardless of whether the actors in the stories had succeeded through their own efforts. More discriminating, the 10- and 18-year-olds realized that "feeling proud" can occur only when the good outcomes that occur are the result of a person's own effort, not of luck or chance.

GUILT   It is only gradually that children develop an appreciation of the central role of personal responsibility in their behavior and thus an understanding of guilt. According to Graham et al. (1984), this understanding emerges in middle childhood. Asking 6- and 9-year-old children to describe situations in which they had felt guilty, these researchers found that only the older children had a clear understanding of this emotion and its relation to personal responsibility. For example, even when they had little control over the outcome of a situation, 6-year-olds often described themselves as feeling guilty: "I felt guilty when my brother and I had boxing gloves on and I hit him too hard . . . sometimes I don't know my own strength." In contrast, 9-year-olds recognized that to feel guilty, it is critical to be responsible for the outcome of a situation: "I felt

guilty when I didn't turn in my homework because I was too lazy to do it." Other studies (Saarni et al., 2006) have reached similar conclusions—namely, that young children focus on simple outcomes, whereas older children, who focus on the role of personal responsibility, understand that unless they themselves caused the outcome, they need not feel guilty. Of course, guilt plays an important role in moral development, especially in terms of regulating behavior or as a response to rule violation (see Chapter 14).

Although we often explore the development of human capacities such as emotional expression and cognitive competence separately, remember that these capacities are mutually dependent. For example, it's clear that the development of specific emotions is closely entwined with such cognitive advances as the ability to understand causality and, hence, personal responsibility.

JEALOUSY   Jealousy is a common emotion that we all experience. From early childhood, when a sibling gets more parental attention than you do, to adolescence, when you resent your best friend's flirtation with your new romantic partner, you experience jealousy. Indeed, jealousy can occur as early as 1 year of age. In one study, children showed signs of jealousy (e.g., sadness, seeking maternal attention, anger) when mothers directed their attention away from their child toward an infant-size doll, a newborn infant, or a peer (Case et al., 1988; Hart et al., 1998). Jealousy is a social emotion; it occurs among three people who have established important social relationships. Generally speaking, two people who have been friends for many years don't experience jealousy in interacting with a new acquaintance.

Recently, Volling and colleagues (2002) explored jealousy among younger (12 months old) and older (2 to 6 years old) children. When mothers or fathers played with one child and encouraged her or his sibling to play alone, both younger and older children expressed jealousy of the sibling who received parental attention. Not surprisingly, the way that children express their jealousy changes across development. Volling and colleagues found that, in response to a jealousy-provoking scenario, younger children displayed distress, whereas older siblings showed sadness and anger. And jealousy reactions are costly: Children who react with jealousy may be less able to focus on their play activities than children who show less jealousy. As in the case of other complex emotions, such as pride and shame, cognitive understanding of emotions helps modify children's jealous reactions. Especially in older siblings, a more sophisticated understanding of emotions may be associated with less jealousy and less disturbed behavior.

Finally, the experience and expression of jealousy depend on the nature of the relationship in which this unpleasant emotion arises. When children have a secure and trusting relationship with their mothers and fathers, jealousy between siblings is less prevalent. Moreover, when parents are in a positive marriage, children are less likely to show jealous reactions with their siblings. Close relationships between child and parent and between the parents themselves serve as a protective factor in buffering children from jealousy reactions.

INDIVIDUAL DIFFERENCES IN EMOTIONS

There are wide individual differences among infants and young children in their readiness to express positive or negative emotions. Babies who are more sociable show less wariness in encounters with strangers than less sociable infants (Bohlin & Hagekull, 1993). Some babies smile more readily and laugh more heartily (La Freniere, 2000). Other babies react more fearfully to novel people and events and are more easily angered than other infants. Perhaps differences in temperament contribute to these differences in emotional reactions. For instance, Kagan (1998) has identified a subset of children whom he calls "behaviorally inhibited." These children tend to be shy, fearful, and introverted, often avoiding even their peers, and they are more anxious and upset by mildly stressful situations than are other children (Kagan, 1998). Behaviorally inhibited

youngsters tend to show atypical physiological reactions—such as rapid heart rates—in stressful situations, and their fearful responses and shyness tend to endure across time, from toddlerhood on into the early school years. However, warm, supportive parents can reduce fearfulness and reduce the likelihood that their children will continue to be abnormally shy and fearful (Gunnar, 1998; Kagan, 1998; Kagan and Snidman, 2004).

Finally, individual differences in positive and negative emotionality are related to children's adjustment (Lengua, 2002). For example, 10-year-olds who exhibited high levels of negative emotionality (fearfulness and irritability) were more likely to have adjustment difficulties. They tended to be depressed and to have conduct problems. Children who were judged emotionally positive (rated high on smiling and laughing) had high self-esteem and social competence, indicating better adjustment.

RECOGNIZING EMOTIONS IN OTHERS

Another challenge for the developing child is to learn how to recognize the emotions others express. According to Malatesta (1982), in the 3 months between the ages of 3 and 6 months, babies are exposed to others' facial expressions some 32,000 times! Learning to interpret these expressions of emotion is a formidable task for an infant. But during this peak period for face-to-face interaction with parents or other caregivers, facial expressions are an effective way for parents to communicate their feelings and wishes to a child who cannot yet understand speech.

In mother-infant face-to-face interactions, babies tend to recognize positive emotions far more frequently than negative ones (Izard et al., 1995; Denham et al., 2007). More specifically, babies may develop the ability to recognize joy earlier than they can recognize anger. In one study, infants between 4 and 6 months of age looked longer at a face showing an expression of joy than at one showing anger (La Barbera et al., 1976). And consistent with the functionalist perspective, recognizing joy before anger has functional value for a baby.

> Recognition of joy can provide rewarding and self-enhancing experiences for the infant. Such recognition can also strengthen the mother-infant bond and facilitate mutually rewarding experiences, particularly if the joy recognition leads to joy expression. . . . [In contrast], anger recognition is not adaptive in the first half year of life. It seems reasonable that the threat of an anger expression would call for coping responses that are beyond the capacity of the 6-month-old. (La Barbera et al., 1976, p. 537)

The joy-anger recognition sequence is also consistent with the course of the infant's own emotional displays. As we saw earlier, smiling and laughter emerge before fear (La Freniere, 2000). Review the Turning Points chart on pages 184–185 for an emotional development time frame.

Children, of course, become more discriminating as they develop; 9- to 10-year-olds can discriminate between Duchenne (or authentic) smiles and non-Duchenne smiles more reliably than can 6- to 7-year-olds (Gosselin et al., 2002). Others suggest that adults are even better than children in recognizing Duchenne smiles (Del Giudice & Colle, 2007).

The nature of early experience alters children's ability to recognize emotions, as the learning perspective on emotional development would predict. For example, 3.5-month-old infants recognize their mothers' emotional expressions earlier than they recognize such expressions in either fathers or strangers. Moreover, when mothers spent more time interacting directly with their babies, their infants were more successful at recognizing their mothers' emotional expressions (Montague & Walker-Andrews, 2002). However, both the quality and the quantity of interactions between parents and infants make a difference in children's ability to recognize emotions. Abused children who experience high levels of threat and hostility are able to identify anger expressions more easily than nonabused children are, but they are less capable of detecting expressions

of sadness (Pollak & Sinha, 2002). The early family environment clearly plays a role in shaping children's abilities to recognize emotions. And culture matters, too. Both Mexican and Chinese children were better than either Euro-American or Australian children in recognizing vocal and/or facial emotional expressions (Cole & Tan, 2007). Both China and Mexico are societies that value group harmony, and a focus on others' feelings is one way to achieve this goal.

It is probably harder for babies to learn to recognize expressions of emotions in others than it is for them to learn to express emotions accurately themselves. Citing the fact that around the world people use similar facial expressions of emotion, some researchers believe that producing these expressions is at least in part genetically determined (Ekman, 1994; Izard, 1994). If this were so, it would help to explain also why both babies and children are more accurate at producing emotional expressions than at interpreting them (Denham et al., 2007; Denham, 1998; Field, 1990). Nevertheless, by the time they are 2 or 3, children show production and recognition skills that are positively correlated: Toddlers who send clear emotional signals also tend to be good at identifying emotions (Magai & McFadden, 1995). Both these abilities continue to improve with age, probably contributing to the older child's ability to participate more often and more successfully in peer group activities as well as to his more sustained and sophisticated social interactions (Denham et al., 2007; Saarni et al., 2006).

EMOTIONAL REGULATION AND EMOTIONAL DISPLAY RULES

Learning how to regulate the expression of their emotions is a major challenge for infants and children (Cole, 2004; Saarni et al., 2006; Thompson, 2006). In this section, we trace the developmental changes in emotional regulation and shifts in children's use of display rules that govern expression of emotions.

Often, humans get their first clue from something they began learning even before they were born: They found that putting their thumbs in their mouths helps soothe them. From this unintentional act of control, infants move to the more deliberate regulation of their emotions. For example, when they encounter a frightening event, they may turn away, place their hands over their faces, or distract themselves by some form of play (Bridges & Grolnick, 1995). Children's methods of emotional control continue to change as they grow older. Mangelsdorf et al. (1995) found that 6-month-olds who confronted a stranger typically looked away or became fussy, whereas 18-month-olds more likely used self-soothing and self-distraction to cope with uncertain or arousing situations.

As infants become toddlers and head toward the preschool years, parents and others start to require them to exert even more control over their emotional expression. Under this pressure, gradually "the intense and unregulated expressions of infancy give way to expressions that are more modulated" (Malatesta et al., 1989, p.19). Several things illustrate this greater self-control over emotions: Emotional expressions become less frequent, less distinct, less intense and exaggerated, and less variable and more conventionalized (La Freniere, 2000; Saarni et al., 2006). For example, a hungry baby may cry in uncontrollable frustration, whereas an older child whose mealtime is delayed will merely pout and complain. And emotional regulation abilities are important predictions of later adjustment (Fox & Calkins, 2003). Children in preschool who were better at regulating their anger showed less externalizing behavior when they entered school; those who were able to distract themselves by shifting attention away from the frustrating situation were less aggressive and disruptive in kindergarten (Gilliom et al., 2002).

At the same time, children begin to learn **emotional display rules** that dictate what emotions to show under what circumstances. This often means learning to separate the visible expression of an emotion from its inner experience. Conforming to various

emotional display rules Rules that dictate which emotions one may appropriately display in particular situations.

social norms, children 8 to 10 years old learn to smile even when they feel unhappy, to feign distress that is not really felt, or to mask amusement when they know they shouldn't laugh (Garner & Power, 1996; Saarni et al., 2006). But children as young as 2 may show an understanding of display rules for emotions (Lewis & Michaelson, 1985). In their earliest attempts to follow these rules, children typically mirror others' behavior by simply exaggerating or minimizing their emotional displays. Moreover, children acquire knowledge about display rules before they are proficient regulators of their own emotional displays (Saarni, 1999).

Culture plays an important role in how children appraise situations, communicate emotions, and act on their feelings. Studying three cultural groups—Brahman and Tamang societies in rural Nepal and a rural town in the United States—Cole et al. (2002) compared the reactions of children to difficult emotionally arousing situations. They interviewed second, fourth, and fifth graders about how they would react to a difficult interpersonal situation, such as someone's spilling a drink on their homework or accusing them falsely of stealing. How would they feel? Would they want others to know their feelings? Why or why not? And what would they do in the situation? As expected, culture clearly influences children's emotional responses. Among the Tamang, a Buddhist group who endorse interpersonal harmony, children were more likely than the other two groups to respond to difficult situations with shame. In contrast, children of the Brahman society, which teaches self-control in social interactions and the careful control of emotions, did not reveal anger or shame in response to their emotionally upsetting problem. Different again were the American children, who were more likely to endorse the display of anger—an emotion consistent with the American value of self-assertion. U.S. children were more problem focused and action oriented than the children in the two Nepali groups, who were more accepting of difficult situations and less likely to seek to alter the situation. Clearly, cultural and religious customs and values shape the ways that children react to emotionally upsetting events. Learning to follow cultural display rules appears to be an important developmental accomplishment. It seems that competence in implementing these rules is linked with better social relationships with peers (Parke et al., 2006; Valiente & Eisenberg, 2006).

HOW CHILDREN THINK ABOUT EMOTIONS

Not only do children act on their emotions, but they learn to think about those emotions as well. If we understand how children think about feelings, we are in a better position to understand why they act emotionally.

A child is invited to a birthday party; another child's favorite pet dies; a third child hears a loud, unexpected bang. When do children become able to think and talk about the varying emotional reactions likely to accompany these different kinds of events? When do they begin to understand the coexistence of multiple emotions? When can they empathize with another person, predicting how that person will feel in a given situation? We try to answer these questions in this section.

Matching Emotions to Situations: Emotional Scripts

Over time, children undergo shifts in the ways they express emotions. They develop a more complete understanding of the meanings of emotion terms and of the situations that evoke different kinds of feelings. According to Saarni et al. (2006), this understanding can be seen as a collection of **emotional scripts**, or complex schemes that enable the child to identify the type of emotional reaction likely to accompany a particular kind of event.

emotional script A complex scheme that enables a child to identify the emotional reaction likely to accompany a particular sort of event.

From a young age, children create a number of such emotional scripts. In a classic study, Borke (1971) told 3- and 4-year-old children simple stories about such things as getting lost in the woods or having a fight or going to a party and asked the children to tell her the emotions they thought the characters in the different stories would be likely to feel. The children easily identified situations that would lead to happiness, and they were reasonably good at identifying stories that were linked with sadness or anger. Other research (Cole & Tan, 2007; Levine, 1995) showed that 3- and 4-year-old children could also describe situations that evoked other emotions, such as excitement, surprise, and fear. Clearly, young children know which emotions go with which situations.

Children's emotional scripts gain in complexity as they mature. For example, 5-year-olds generally understand only those situations that lead to emotions with a recognizable facial display (e.g., anger, displayed in frowning) or that lead to a particular kind of behavior (e.g., sadness, displayed in crying or moping about). By the time they are 7, however, children can describe situations that elicit more complicated emotions with no obvious facial or behavioral expressions, such as pride, jealousy, worry, and guilt. And by the time they reach 10 or 14, children can describe situations that elicit relief and disappointment (Harris et al., 1987). A similar developmental sequence is found in a variety of cultures, including Great Britain, the United States, the Netherlands, and Nepal (Harris, 1989, 1995). Culture matters: Children in the United States react to a request to stop playing and go to bed with anger, but first graders in Nepal are happy. In Nepal, children value cosleeping with adults and so are not upset with the cessation of play (Cole & Tamang, 1998). Finally, as we will see in Chapter 15, autistic children are less proficient in their understanding of emotions compared to normally functioning children (Baron-Cohen, 2001; Losh & Capps, 2006).

Multiple Emotions, Multiple Causes

Another aspect of emotional understanding that develops only gradually is the awareness that one can have more than one feeling at a time and that one can even experience two or more conflicting feelings at the same time. Although toddlers and even young infants show signs of experiencing conflicting feelings, children's ability to understand and express their knowledge of emotions emerges slowly and lags well behind their capacity to experience ambivalent emotions (Arsenio & Kramer, 1992; Pons, Harris, & deRosnay, 2004; Wintre & Vallance, 1994). According to Harter (Harter, 2006; Harter & Buddin, 1987), children show a clear developmental sequence in their ability to understand multiple and conflicting feelings. From their study of children between the ages of 4 and 12, Harter and Buddin (1987) derived the five stages of emotional understanding shown in Table 6-2. As you can see, it is not until the fourth stage, at about the age of 10, that children acquire the ability to conceive of opposite feelings existing simultaneously.

As they develop, children learn to consider more and more aspects of an emotion-related situation, such as the desires, goals, and intentions of the people involved. Children realize that people's emotional expressions are produced by inner states and that these expressions are not responsive solely to the characteristics of the situation. For example, young children often get angry when someone thwarts, wrongs, or frustrates them, regardless of whether the wrongful act was intentional, but children 7 years and older, like adults, tend to reserve their anger for situations in which they think a person intended to upset them (Levine, 1995). We return to this issue of inferring others' internal mental states in our discussion of theory of mind in Chapter 9.

THE FAMILY'S ROLE IN EMOTIONAL DEVELOPMENT

Families play a major role in children's emotional development. Suzanne Denham (1998), a leading emotions researcher, has outlined three ways in which families influ-

Table 6-2 Children's understanding of multiple and conflicting emotions

Approximate Ages	Children's Capabilities
4 to 6	Conceive of only one emotion at a time: "You can't have two feelings at the same time."
6 to 8	Begin to conceive of two emotions of the same type occurring simultaneously: "I was happy and proud that I hit a home run." "I was upset and mad when my sister messed up my things."
8 to 9	Describe two distinct emotions in response to different situations at the same time: "I was bored because there was nothing to do and mad because my mom punished me."
10	Describe two opposing feelings where the events are different or different aspects of the same situation: "I was sitting in school worrying about the next soccer game but happy that I got an A in math." "I was mad at my brother for hitting me but glad my dad let me hit him back."
11 to 12	Understand that the same event can cause opposing feelings: "I was happy that I got a present but disappointed that it wasn't what I wanted."

Sources: Based on Harter, 2006; Harter & Buddin, 1987.

ence children's emotions (Figure 6-7). First, family members' own patterns of emotional expressiveness serve as models for the child's emotional expressiveness. Second, parents' and siblings' specific reactions to children's emotions encourage or discourage certain patterns of emotional expressiveness. Third, parents often act as emotional coaches by talking about emotions and explaining and exploring children's understanding of their own and other people's emotional responses.

Just as children learn to share toys, to say their ABCs, and sometimes to hit people by watching others, they learn a great deal about how and when to express emotions by watching members of their family.

> Claire learned about anger and sadness. She witnessed an argument between her mother and father. The mother began to cry out of frustration and sadness over the long-standing, unresolved conflict. Claire watched with eyes wide. Then she got tearful herself. (Denham, 1998, p. 106)

Families vary in their emotional expressiveness. Some are subdued and restrained in their emotional reactions; others are more demonstrative and engage in more intense and frequent emotional displays. Many studies have shown similarities between parents and their children in both level of emotional expressiveness and types of emotions typically displayed (Eisenberg et al., 2001; Halberstadt et al., 2001). Children who grow up
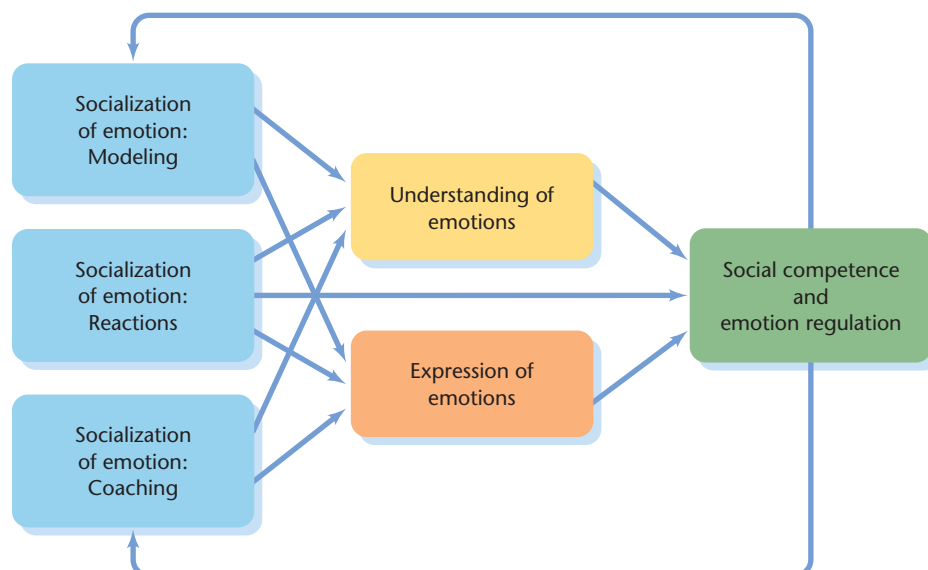
Figure 6-7

A model of emotional socialization

Parental socialization practices lead to changes in understanding and expression of emotions—which, in turn, lead to changes in children's social competence and in their abilities to regulate their emotions.

Source: Denham, 1998.

in a positive emotional home with lots of happiness and joy are more likely to exhibit positive emotions (Halberstadt et al., 2001). However, children reared in a negative family environment characterized by hostility and conflict are more likely to display negative emotions, such as anger and sadness (Denham et al., 2007; Halberstadt et al., 2001). To take an extreme example, children who have been abused by parents, particularly girls, are more likely to display shame and less likely to show pride than their non-abused peers; according to Alessandri and Lewis (1996), this reflects the intense and frequent negative feedback these girls receive from their parents. Children can learn both by watching how parents react emotionally to them as well as by observing how parents and other family members react emotionally to each other. Watching mom and dad argue, siblings squabble, or a mother smile at a baby's sister are all ways of learning about the world of emotions.

Or sometimes, parents' reactions contribute to children's emotional repertoire by helping them cope more effectively with their emotions and by improving their understanding of what emotions may appropriately be displayed.

> Stacey's mother bought a new wading pool and had high hope for the fun the family could have. Whether told to wait, get in or get out of the pool, Stacey cried and wouldn't be consoled. Nothing could please her. Finally she had a mini-tantrum, lying down on the floor, knocking over a chair, and kicking out at things. Her mother told her she couldn't act like that . . . she let Stacey cry a while and then consoled her, hugging her and discussing what had happened. Then everyone went back to the pool and had a good time! Stacey learned that some intensities and means of expression are not acceptable and that talking about rather than venting feelings can have a positive outcome. (Denham, 1998, p. 107)

And there is evidence that parental reactions are, indeed, important contributions to children's emotional development. Children whose parents help them with their emotions are better able to manage emotional upset on their own and are also more accepted by their peers (Gottman et al., 1996). When parents are punitive or dismissive of their children's emotions, the children are hampered in regulating their own emotions (McDowell & Parke, 2000; Parke et al., 2006; Valiente & Eisenberg, 2006). Dismissive parents may belittle the child's emotion (e.g., "There's no reason for you to be [sad][angry] . . . ") or show little interest in how the child is feeling (e.g., "Don't worry about it—go watch TV"). Punitive parents may scold or punish their child for expressing emotions, especially negative ones such as anger or sadness. Dismissive or punitive parents "fail to use emotional moments as a chance to get closer to the child or to help the child learn lessons in emotional competence" (Goleman, 1995, p. 191).

Some parents actively deal with the world of emotions by coaching their children and by discussing emotions with them. Anikka learned about emotions while looking at a picture book with her mother. In the story they read, a new puppy tried to run away into the path of a school bus.

> **Mother:** They were frightened . . . [They] grabbed the dog and brought it to safety. See the worried looks?
>
> **Anikka:** They look so scared.
>
> Anikka learned some new vocabulary for the emotion of fear, new cues for fear, and a new reason to be fearful—when the safety of a loved one is endangered. (Denham, 1998, p. 107)

Parents who are good emotional coaches value emotional expression, are aware of their own emotions, and are willing to help their children with theirs. Help often takes the form of talking about feelings, for children whose parents discuss emotions are better at taking the perspective or viewpoint of others and at understanding their own and others' emotions. For example, Dunn and her colleagues (Dunn et al., 1995; Dunn & Hughes, 1998) found that 3-year-old children's conversations with their mothers and siblings about feeling states were closely related to the same children's ability, at the age of 6, to understand other people's emotions. Children from families in which there was more discussion

of feelings were better able to recognize others' emotions than children raised in families in which feelings were less often discussed (Dunn, 2004). In general, the better a child understands emotions, the more skilled he is at such social behaviors as problem solving and conflict resolution, and the more likely he is to be accepted by peers and to form and maintain friendships (Denham et al., 2007; Dunn, 2004; Parke & O'Neil, 2000).

It is important to remember that not only parents but also peers and siblings function as socializers of emotion. When children display anger, their peers often respond with anger or rejection (Denham et al., 2007; Fabes et al., 1996). Similarly, siblings often shape children's emotional reactions by their positive or negative responses or by alerting a parent to their siblings' angry emotional outbursts (Denham et al., 2007; Dunn, 1988, 2004). Interactions with siblings also contribute to a child's development of emotional understanding. Pretend play with siblings or friends, often characterized by conflict and other intense emotional experiences, is associated with increased understanding of other people's feelings and beliefs (Dunn & Hughes, 2001).

Finally, as we have often noted, socialization is a two-way process, and parent, peer, and sibling reactions are shaped by the characteristics and behavior of the children who are the objects of their endeavors. Recall from our discussion of temperament (Chapter 2) how children differ in the intensity of their reactions to events and how easily and quickly they calm themselves. These temperamental differences probably play an important role in the socialization of emotion. Children of difficult temperaments, for example, may require more direct intervention, such as coaching, than children with easy temperaments. Clearly, children play important roles in their own emotional socialization.

THE DEVELOPMENT OF ATTACHMENT

Closely related to emotional development is the development of **attachment**, a strong emotional bond that forms in the second half of the first year between an infant and one or more of the child's regular caregivers. Visible signs of attachment are the warm greetings the child gives her parents when they approach, smiling broadly, stretching out her arms, and her active efforts to make contact when picked up, touching her parent's face and snuggling close. Attachment can also be seen in a child's efforts to stay near his parents in an unfamiliar situation, crawling or running to them and holding on to a leg. Attachment can also be seen in the distress that older babies show when their parents leave them temporarily; its negative counterpart is expressed in the separation protest that we discussed earlier.

attachment A strong emotional bond that forms between infant and caregiver in the second half of the child's first year.

The emergence of attachment is one of the developmental milestones in the first year of life. It is of great interest to researchers not only because it is so intense and dramatic but also because it is thought to enhance the parents' effectiveness in the later socialization of their children. Children who have developed an attachment to their parents presumably want to maintain their parents' affection and approval and so are motivated to adopt the standards of behavior the parents set for them.

Attachment is such an important and widely studied topic that we devote the rest of this chapter to it. We begin this section with several theories of why attachment develops, including psychoanalytic, learning, and ethological theories. We next look at the way attachment evolves over the first 2 years of life and then consider the special characteristics of attachment to fathers and to peers. In the last section of the chapter, we discuss variations in the quality of attachment and in the consequences of such variations.

Theories of Attachment

A variety of theories have been offered to explain the development of attachment, including psychoanalytic, learning, and ethological theories. Each position makes different

assumptions about the variables that are important for the development of attachment and about the processes underlying the development of an attachment relationship.

psychoanalytic theory of attachment Freud's theory that babies become attached first to the mother's breast and then to the mother herself as a source of oral gratification.

PSYCHOANALYTIC THEORY   According to Freud's classic **psychoanalytic theory of attachment**, which we introduced in Chapter 1, babies become attached to their caregivers because the caregivers are associated with gratification of the infant's innate drive to obtain pleasure through sucking and other forms of oral stimulation. On this line of thinking, a woman who breast-feeds her baby is particularly important to her child's oral gratification. The baby becomes attached first to the mother's breast and ultimately to the mother herself. Although this argument from traditional psychoanalytic theory has fallen out of favor today, the stress it places on a person's inner needs and feelings and its focus on mother-infant interaction remain important influences in the study of infant attachment.

learning theory of attachment The theory that infants become attached to their mothers because a mother provides food, or primary reinforcement, and thus becomes a secondary reinforcer.

secondary reinforcer A person or other stimulus that acquires reinforcing properties by virtue of repeated association with a primary reinforcer.

LEARNING THEORY   Like psychoanalytic theory, the **learning theory of attachment** has traditionally associated the formation of mother-infant attachment with the mother's reduction of the baby's primary drive of hunger. Because the mother provides the infant with food, a *primary reinforcer*, she herself becomes a **secondary reinforcer**. Presumably, this ability to satisfy the baby's hunger forms the basis for infant attachment to the mother or any other caregiver linked to feeding.

Many studies, however, have challenged the view that feeding is critical for the development of attachment. In what is probably the most famous of these, Harry Harlow separated infant monkeys from their real mothers and raised them in the company of two surrogate mothers. One "mother" was made of stiff wire and had a feeding bottle attached to it; the other was made of soft terrycloth but lacked a bottle (Harlow & Zimmerman, 1959). Especially in moments of stress, the baby monkeys preferred to cling to the cloth mother, even though she dispensed no food. Attachment to this surrogate mother clearly didn't require the reduction of hunger.

Research on humans tells a similar story. Schaffer and Emerson (1964) found that babies formed attachments to their fathers and other frequently seen adults who played little or no role in the child's feeding. They found that babies whose mothers were relatively unresponsive and distant, except for routine physical care, but whose fathers were attentive and stimulating tended to form paternal attachments, even though they actually spent more time with their mothers.

The central point of the learning theory explanation is that attachment is not automatic; it develops over time as a result of satisfying interactions with responsive adults. Some learning theorists suggest that the visual, auditory, and tactile stimulation that adults provide in the course of their daily interactions with an infant are the basis for the development of attachment (Gewirtz, 1969). According to this view, babies are initially attracted to their regular caregivers because they are the most important and reliable sources of this type of stimulation. As interactions with these caregivers continue over weeks and months, infants learn to depend on and to value these special adults in their lives, becoming attached to them.

cognitive developmental view of attachment The view that to form attachments infants must differentiate between mother and stranger and understand that people exist independent of the infant's interaction with them.

COGNITIVE DEVELOPMENTAL THEORY   According to the **cognitive developmental view of attachment**, before specific attachments can occur, the infant not only must be able to differentiate between her mother and a stranger but also must be aware that people still exist even when she cannot see them. That is, she must have developed what Piaget terms *object permanence*, or the knowledge that objects, including people, have a continuous existence apart from her own interaction with them. As we will see in Chapter 8, there is some evidence that children as young as 3.5 months have an awareness of object permanence, although Piaget believed that this awareness did not begin to evolve until 7 to 8 months of age.

Advances in the infant's cognitive development can also account, in part, for the gradual shift in the ways attachment is expressed. Physical proximity to attachment

figures becomes less important as children grow older. Children are now increasingly able to maintain psychological contact with a parent through words, smiles, and looks. In addition, because they are also better able to understand that parental absences are sometimes necessary and usually temporary, they are less upset by separations. Parents can reduce their children's distress over separations further by explaining the reasons for their departures. In one study, for instance, 2-year-olds handled separation from their mothers much better when the mothers gave them clear information ("I'm going out now for just a minute, but I'll be right back") than when the mother left without a word (Weinraub & Lewis, 1977).

ETHOLOGICAL THEORY   Another approach that has emphasized the reciprocal nature of the attachment process is John Bowlby's **ethological theory of attachment** (1958, 1969, 1973). Both evolutionary theory and observational studies of animals helped shape this theory, and an important early demonstration of the value of the ethological approach was provided by Lorenz's (1952) classic studies of imprinting in ducklings. By the process of **imprinting**, newborn birds and the young of other infrahuman animals can develop an attachment to the first object they see during a brief, critical period after their birth. In Lorenz's case, the young ducklings he studied became attached to Lorenz himself! Bowlby suggested that attachment has its roots in a set of instinctual infant responses that are important for the protection and survival of the species. The infant responses of crying, smiling, sucking, clinging, and following (visually at first and later motorically) both elicit the parental care and protection that the baby needs and promote contact between the child and the parents. Just as the infant is biologically prepared to respond to the sights, sounds, and nurturance provided by the parents, so the parents are biologically prepared to respond to the baby's eliciting behaviors. As a result of these biologically programmed responses, both parent and infant develop a mutual attachment.

The value of Bowlby's position lies in its emphasis on the active role in the formation of attachment played by the infant's early social signaling systems, such as smiling and crying. Another attractive feature is the theory's stress on the development of mutual attachment, whereby both partners, not just one, become bonded to one another (Cassidy, 1999; Thompson, 2006). From this perspective, attachment is a relationship, not simply a behavior of either the infant or the parent (Sroufe et al., 2005). More controversial is Bowlby's suggestion that these early behaviors are biologically programmed. As we have seen, for example, there is considerable evidence that smiling has social as well as biological origins.

ethological theory of attachment Bowlby's theory that attachment derives from the biological preparation of both infant and parents to respond to each other's behaviors in such a way that parents provide the infant with care and protection.

imprinting The process by which birds and other infrahuman animals develop a preference for the person or object to which they are first exposed during a brief, critical period after birth.

How Attachment Evolves

Attachment does not develop suddenly and unheralded but rather emerges in a series of steps, moving from a baby's general preference for human beings to inanimate objects to a child's real partnership with its parents. Schaffer (1996) proposes four phases in the development of attachment; these are outlined in Table 6-3. In the first phase, which lasts only a month or 2, the baby's social responses are relatively indiscriminate. In the second phase, the baby gradually learns to distinguish familiar from unfamiliar people. As you learned in Chapter 4, even very young infants can distinguish their mothers' faces, voices, and even smells from those of other women. However, although a baby under 6 months of age can make these discriminations between his mother and other caregivers and prefers familiar caregivers to strangers, he does not yet protest when familiar caregivers depart; he is not yet truly attached to these people.

In the third phase, which begins when the baby is about 7 months old, specific attachments develop. Now the infant actively seeks contact with certain regular caregivers, such as the mother, greeting them happily and often crying when those people temporarily depart. The baby does not show these behaviors to just anyone—only to *specific*

Name	Age Range (months)	Principal Features
1. Preattachment	0–2	Indiscriminate social responsiveness
2. Attachment-in-the-making	2–7	Recognition of familiar people
3. Clear-cut attachment	7–24	Separation protest; wariness of strangers; intentional communication
4. Goal-corrected partnership	24 on	Relationships more two-sided: children understand parents' needs

attachment figures. When the child passes the 2-year mark and enters toddlerhood (from about 2 to 5), the attachment relationship moves into the final phase—the so-called goal-corrected partnership (Bowlby, 1969). At this point, owing to advances in cognitive development, children become aware of other people's feelings, goals, and plans and begin to consider these things in formulating their own actions. As Colin (1996) noted, "the child becomes a partner in planning how the dyad will handle separations" (p. 72).

Attachment to Fathers

Infants develop attachments not only to their mothers but also to their fathers and to a variety of other persons with whom they regularly interact. When children are a little older, for example, they often develop attachments to siblings or other peers. Moreover, according to anthropologists (Harkness & Super, 2002; Weisner & Gallimore, 1977), mothers are exclusive caregivers in only about 3% of human societies. In as many as 40% of societies, mothers are not even the major caregivers. And as we will see later, the quality of attachment relationships can vary greatly (Sroufe et al., 2005).

FATHERS   Today's American fathers often take a much more active role with their infants than fathers in past generations; just like mothers, fathers develop mutual attachments with their babies (Parke, 2002). Fathers who have the opportunity to interact with their infants in the first few days after the infants are born tend to hold, touch, talk to, and kiss them just as much as mothers do (Parke, 1996). And later in their first year of life, the children of these dads showed patterns of attachment to their fathers quite similar to their attachment to their mothers.

In one study, older babies showed similar patterns of attachment to their mothers and fathers in a situation in which a friendly but unfamiliar visitor observed the children in their homes with both parents present (Lamb, 1997, 2004). In this nonstressful situation, the babies showed no preference for either parent in their attachment behavior. They were just as likely to touch, approach, and be near their fathers as their mothers. In other, stressful situations, however, babies generally look to their mothers for security and comfort if she is available (Belsky & Cassidy, 1994; Lamb, 1997, 2004). This is probably because the mother has most often served this role in the past.

But although babies can be strongly attached to their fathers, American fathers are usually less involved than mothers in an infant's routine care regardless of ethnicity. African American, Latino, and European American fathers all show this pattern (Parke et al., 2005). This is also true of grandfathers compared with grandmothers (Smith & Drew, 2002). Significantly, American fathers participate more in caregiving when the mother is supportive of the father's involvement and views him as a competent caregiver (Beitel & Parke, 1998). Father involvement in infant care also increases when the mother is less available for such reasons as recovery from a cesarean section delivery (Pederson et al., 1980) or employment outside the home (Coltrane, 1996).

In some cultures, particularly hunter-gatherer societies where the search for food and other necessities requires the efforts of both men and women, fathers may be more

likely to share in child care. According to Hewlett (2004), fathers among the Aka, who live in the southern part of the Central African Republic and the northern reaches of the Democratic Republic of Congo, provide more direct care to their babies than fathers in any other known society. Among the Efe, however, another forager society, in Congo, child care is considered a woman's responsibility, and although Efe fathers spend a great deal of time with their infants, a relatively small percentage of that time goes into direct child care (Morelli & Tronick, 1992). Among the Agta, in Cagayan, Philippines, a hunter-gatherer society in which women and men share labor and subsistence activities almost equally, mothers remain the primary caregivers (Griffin & Griffin, 1992, 1999).

In many cultures, fathers have a special role in the infant's development—that of playmate. The quality of a father's play with a baby generally differs from a mother's: Fathers engage in more unusual and physically arousing games (especially with their sons), whereas mothers tend to stimulate their babies verbally and to play quieter games such as peekaboo (Parke, 1996, 2002). Even when fathers have assumed the role of their babies' primary caregiver, they tend to display this physically arousing style of interaction (Field, 1978; Hwang, 1986). Although American fathers, as well as fathers in other countries such as Australia, Great Britain, and Israel, spend four to five times more time playing with their infants than caring for them, apparently not all fathers engage in rough-and-tumble play with their children (Lamb, 1987; Roopnarine, 2004). Fathers in India, Central Africa, and Sweden are apparently less likely to engage in this style of play (Hewlett, 2004; Roopnarine, 2004). Even U.S. fathers who enter parenthood at a later age (over 35) tend to be less physical in their play than younger men (Neville & Parke, 1997).

Mothers and fathers continue to show these different styles of play as their children grow older, well into the early childhood years (MacDonald & Parke, 1986). We don't yet know whether these mother-father differences in play mode are the result of biology or experience, but whatever their cause, infants tend to react more positively to a father's style of play than to a mother's (Field, 1990; Parke et al., 2005). When given a choice of play partners, 18-month-olds in one study reliably chose their fathers more often than their mothers (Clarke-Stewart, 1978), but perhaps this preference for dads may be less pronounced in contemporary families in which both parents are working and away from their children during the day. Probably, children like playing with their fathers because they make more exciting and unpredictable playmates.

Clearly, culture is important in shaping fathering roles, but does biology play a role in preparing men for their fatherhood role as well? Mothers, as well as fathers, undergo a variety of hormonal changes during pregnancy and childbirth that makes them sensitive to infant cries and primed for parenthood. Men experience changes in several hormones, including a drop in testosterone after the birth of the baby, when the father has the first opportunity to interact with his new offspring (Storey et al., 2002). Men with lower testosterone were more responsive to infant cues such as crying and held baby dolls longer than men who did not show these hormonal decreases (Fleming et al., 2002). These shifts are especially true for men who were closely involved with their wives during pregnancy, which suggests that intimate ties between partners during pregnancy may stimulate hormonal changes. This is an important reminder that hormones may alter social behavior, but social relationships may modify hormonal levels as well. Clearly, fathering is multiply determined with social/cultural, developmental, and even biological factors playing roles in the emergence of fathering and infant-father attachment.

Young American fathers are particularly likely to engage in rough-and-tumble play with their young sons.

Other Objects of Attachment

Although infants' most significant attachment relationships are usually with fathers and mothers, as Table 6-4 shows, a variety of other individuals are important in the infant's social world, including peers, siblings, and relatives such as grandparents, aunts, and uncles (Berlin & Cassidy, 1999; Smith & Drew 2002). Peers can become important attachment figures, even for very young children. For example, one investigator found that in a preschool where some children were transferring to new schools, both those who were leaving and those who were staying behind experienced a variety of reactions, including increased fussiness, heightened activity level, negative affect, illness, and changes in eating and sleeping patterns (Field, 1986). These reactions were viewed as separation stress associated with the loss of familiar peers. For an even more dramatic illustration of the ability of young children to form close attachment relationships with one another, see Box 6-2. Further, as children reach adolescence, they develop attachment relationships with friends and with romantic partners (Collins & VanDulman, 2006; Furman et al., 2002). For a discussion of romantic attachments, see Chapter 12.

THE NATURE AND QUALITY OF ATTACHMENT

Like most aspects of human development, the formation of early attachments is not uniform from one child to another or from one relationship to the next. Many children form what appear to be highly secure attachments. The important adults in their lives seem to serve as a source of nurturance and affection that gives these youngsters confidence to explore the world and become more independent. For other children, however, attachments seem much less secure and dependable. Researchers describe such variations as differences in the *quality* of attachments.

Before we examine some of the specific factors that may affect the nature and quality of individual child-parent attachments, such as parenting styles and infant temperament, let us consider a classic body of work that has provided a means of characterizing attachment relationships of different qualities. Mary Ainsworth's studies, based on her concept of the *secure base* and using the so-called Strange Situation, have been replicated many times and in many parts of the world.

secure base According to Ainsworth, a caregiver to whom an infant has formed an attachment and whom the child uses as a base from which to explore and as a safe haven in times of stress.

Methods of Assessing Attachment Relationships

Proposing that infants organize their attachment behavior around a particular adult so that they seem to be using the adult as a **secure base** for exploration or a safe haven in the event of distress, Ainsworth made valuable observations of infants' attachment and

Table 6-4

The breadth of children's attachments

Source: Schaffer, 1996.

Attachment Target	Percentage of Infants Attached	
	Initially	At 18 Months
Mother	95	81
Father	30	75
Grandparent	11	45
Relative other than sibling	8	44
Sibling	2	24
Other child	3	14

BOX 6-2

Risk and Resilience

PEERS AS ATTACHMENT FIGURES

Anna Freud's classic account (Freud & Dann, 1951) of the behavior of six young German-Jewish orphans brought to England during World War II not only highlights the incredible resilience of these at-risk children, torn from their families and kept in concentration camps from age 1 through 4, but also illustrates the depth and intensity that peer attachments can have. When they were 4 years old, these children, most of whose parents had died in gas chambers, arrived at Bulldog Banks, a small English country home that had been transformed into a nursery for war children. Quickly, they formed intense, protective attachments to each other while they ignored or were actively hostile to their adult caregivers. Bulldog Banks was the first time any of them had experienced living in a small, intimate setting with adults who offered them kindness rather than cruelty.

In their early days at the nursery, these six children were wild and uncontrollable. Within a few days, they destroyed or damaged much of the furniture and all the toys given them. Most of the time, they ignored the adults, but when they were angry, they would bite, spit, or swear at them, often calling them *bloder ochs* ("stupid fools").

The contrast between the children's hostile behavior toward their caregivers and their solicitous, considerate behavior toward one another was surprising. In one case, when a caregiver accidentally knocked over one of the children, two of the other children threw bricks at her and called her names. The children resisted being separated from each other even for special treats like pony rides. When one child was ill, the others wanted to remain with her. They showed little envy, jealousy, rivalry, or competition with each other. The sharing and helping behaviors of these children with one another were remarkable in children of this age.

Here are some typical incidents in the children's first 7 months at Bulldog Banks (Freud & Dann, 1951, pp. 150–168).

- The children were eating cake, and John began to cry when he saw there was no cake left for a second helping. Ruth and Miriam, who had not yet finished their portions, gave him the remainder of their cake and seemed happy just to pet him and comment on his eating the cake.
- In very cold weather one child lost his gloves, and another child loaned his gloves without complaining about his own discomfort.

Even in fearful situations, children were able to overcome their trepidation to help others in their group.

- A dog approached the children, who were terrified. Ruth, though badly frightened herself, walked bravely to Peter, who was screaming, and gave him her toy rabbit to comfort him. She comforted John by lending him her necklace.
- On the beach in Brighton, Ruth was throwing pebbles into the water. Peter, who was afraid of waves, did not dare to approach them. Suddenly, in spite of his fear, he rushed to Ruth, calling out: "Water coming, water coming," and dragged her back to safety.

When, finally, the children began to form positive relations with adults, they made them on the basis of group feelings. Their relationships with their caregivers had none of the demanding, possessive attitudes often shown by young children toward their own mothers. They simply began to include the adults in their group and to treat them, in some ways, as they treated each other. For those children in whom this phase of general attachment was eventually followed by a specific attachment to an individual caregiver, clinging and possessive behaviors did appear. But for all the children throughout their year's stay at Bulldog Banks, the intensity of such attachments to surrogate mothers was never as great as it would have been in normal mother-child relations, and the relationships were never as binding as those they maintained with their peers.

These children's circumstances were unusual, and we must therefore interpret this classic work with caution. At the same time, the children's behavior clearly demonstrates not only the intensity of attachments that can develop among young children but also the resilience that enabled these children to survive unimaginable horrors.

Strange Situation A testing scenario in which mother and child are separated and reunited several times; enables investigators to assess the nature and quality of a mother-infant attachment relationship.

secure attachment A kind of attachment displayed by babies who are secure enough to explore novel environments, who are minimally disturbed by brief separations from their mothers, and who are quickly comforted by their mothers when they return.

exploratory behavior at about 1 year of age (Ainsworth, 1973; Waters et al., 1995). The striking differences in the infants' behaviors in what is known as the **Strange Situation**, a carefully worked-out scenario in which a mother twice leaves her baby alone or with a stranger and returns twice to be reunited with her child (see Table 6-5), enabled Ainsworth to assess the infant-mother relationships and to classify them according to their nature and quality. This procedure is typically used with infants at 8 or 9 months of age. Subsequent research both expanded on Ainsworth's work and added a longitudinal feature, comparing children's behavior from infancy to young adulthood (Main et al., 2005; Solomon & George, 1999; Sroufe et al., 2005).

As we examine Ainsworth's classification system, you may find it useful to look at Table 6-6, which summarizes four categories of attachment relationship: secure, insecure-avoidant, insecure-resistant, and insecure-disorganized attachment. As we note here, the importance of these classifications lies in their value in predicting differences in infants' and children's later emotional, social, and cognitive development. Of the white, middle-class children studied, Ainsworth classified some 60% to 65% as displaying **secure attachment** to their mothers because they readily sought contact with her after the stress of her departure in an unfamiliar setting and were quickly comforted by her, even if initially quite upset. These babies also felt secure enough to explore a novel environment when the mother was present. They did not whine and cling to her but actively investigated their surroundings, as if the mother's presence gave them confidence. In familiar situations, such as the home, these children are minimally disturbed by minor separations from the mother, although they greet her happily when she returns.

Ainsworth classified the remaining children she studied as insecure in one of several ways. Exhibiting **insecure-avoidant attachment** were children who typically showed

Table 6-5

The Strange Situation scenario

Episode Number	Persons Present	Duration	Brief Description of Actions
1	Mother, baby, and observer	30 seconds	Observer introduces mother and baby to experimental room, then leaves. (Room contains many appealing toys scattered about.)
2	Mother and baby	3 minutes	Mother is nonparticipant while baby explores; if necessary, play is stimulated after 2 minutes.
3	Stranger, mother, and baby	3 minutes	Stranger enters. First minute: stranger silent. Second minute: stranger converses with mother. Third minute: stranger approaches baby. After 3 minutes: mother leaves unobtrusively.
4	Stranger and baby	3 minutes or less	First separation episode. Stranger's behavior is geared to that of baby.
5	Mother and baby	3 minutes or more	First reunion episode. Mother greets and/or comforts baby, then tries to settle the baby again in play. Mother then leaves, saying "bye-bye."
6	Baby alone	3 minutes or less	Second separation episode.
7	Stranger and baby	3 minutes or less	Continuation of second separation. Stranger enters and gears behavior to that of baby.
8	Mother and baby	3 minutes	Second reunion episode. Mother enters, greets baby, then picks baby up. Meanwhile, stranger leaves unobtrusively.

Table 6-6   Children's attachment behavior in the Strange Situation: A typology

1 Year Old	6 Years Old
Secure Attachment	
On reunion after brief separation from parents, children seek physical contact, proximity, interaction; often try to maintain physical contact. Readily soothed by parents and return to exploration and play.	On reunion, children initiate conversation and pleasant interaction with parents or are highly responsive to parents' overtures. May subtly move close to or into physical contact with parents, usually with rationale such as seeking a toy. Remain calm throughout.
Insecure-Avoidant Attachment	
Children actively avoid and ignore parents on reunion, looking away and remaining occupied with toys. May move away from parents and ignore their efforts to communicate.	Children minimize and restrict opportunities for interaction with parents on reunion, looking and speaking only as necessary and remaining occupied with toys or activities. May subtly move away with rationale such as retrieving a toy.
Insecure-Resistant Attachment	
Although infants seem to want closeness and contact, their parents are not able effectively to alleviate their distress after brief separation. Child may show subtle or overt signs of anger, seeking proximity and then resisting it.	In movements, posture, and tones of voice, children seem to try to exaggerate both intimacy and dependence on parents. They may seek closeness but appear uncomfortable (e.g., lying in parent's lap but wriggling and squirming). These children sometimes show subtle signs of hostility.
Insecure-Disorganized Attachment	
Children show signs of disorganization (e.g., crying for parents at door and then running quickly away when door opens; approaching parent with head down) or disorientation (e.g., seeming to "freeze" for a few seconds).	Children seem almost to adopt parental role with parents, trying to control and direct parents' behavior either by embarrassing or humiliating parents or by showing extreme enthusiasm for reunion or overly solicitous behavior toward parents.

Sources: Adapted from Ainsworth, Blehar, Waters, & Wall, 1978; Main & Cassidy, 1988; Main & Hesse, 1990; Solomon & George, 1999.

little distress over the mother's absence in the Strange Situation, at least on her first departure. However, these children actively avoided their mothers on their return: They turned away from mothers, increased their distance from them, and paid them no attention. After the mother's second departure, during which time many of these babies became visibly upset, they again avoided her on her return. Later researchers have found that this first insecure pattern typically characterizes about 20% of American samples.

A second type of insecure relationship is called **insecure-resistant attachment**. Researchers have found that infants who display this type of attachment (and who make up about 10% to 15% of American samples) often become extremely upset when the mother leaves them but are oddly ambivalent toward her when she returns. Intermittently, they seek contact with her and then angrily push her away.

The third type of insecure relationship, identified by later researchers, is called **insecure-disorganized attachment** (Solomon & George, 1999). When babies who display this kind of behavior are reunited with their mothers in the Strange Situation scenario, they seem disorganized and disoriented. They look dazed, they freeze in the middle of their movements, or they engage in repetitive behaviors, such as rocking. These children also seem apprehensive and fearful of their attachment figures and are unable to cope in a consistent and organized way with distress in the presence of their caregivers. Note that all these attachment classifications reflect the quality of the relationship between the child and the parent, not traits of either the child or the parent. Interestingly, as Table 6-6 shows, similar child-parent relationship patterns can be observed in these children and parents when the children are 6 years old (Main & Cassidy, 1988).

New methods for assessing attachment have been developed in recent years. Relying on the judgments of caregivers who are familiar with the child's behavior, the

insecure-avoidant attachment A type of attachment shown by babies who seem not to be bothered by their mothers' brief absences but specifically avoid them on their return, sometimes becoming visibly upset.

insecure-resistant attachment A kind of attachment shown by babies who tend to become very upset at the departure of their mothers and who exhibit inconsistent behavior on their return, sometimes seeking contact, sometimes pushing their mothers away.

insecure-disorganized attachment A type of attachment shown by babies who seem disorganized and disoriented when reunited with their mothers after a brief separation.

Attachment Q Sort (AQS) (Solomon & George, 1999; van IJzendoorn et al., 2004; Waters, 1995) calls for the mother or other caregiver to sort a set of cards containing phrases that describe the child's behavior (e.g., "rarely asks for help," "keeps track of mother's location while playing around the house," "quickly greets mother with a big smile when she enters the room") into sets ranging from those that are most descriptive of the child to those that are least descriptive. The method, which is useful for children between the ages of 1 and 5, was designed to facilitate making ratings, in naturalistic settings, of a broad variety of attachment-related behaviors (e.g., secure-base behavior, attachment-exploration balance, and affective responsiveness). As we will see later, other investigators (Bretherton, 2005; Solomon & George, 1999) have developed later-age assessments of attachment that closely resemble the Strange Situation and permit across-time comparisons between children in infancy and at later ages.

Finally, other innovative procedures for assessing attachment have been developed that do not rely on mother-child separations. The California Attachment Procedure (CAP) focuses on how mothers manage children's fear and upset in response to stressful events such as loud noises or a scary robot instead of maternal separations (Clarke-Stewart et al., 2002). This approach has been used with children at 18 months and more accurately classifies the attachment of children who are accustomed to routine separations from their parents such those involved in child care, a topic we address later in the chapter.

A question that continues to interest researchers is whether Ainsworth's model is equally useful in different cultures both within the United States and in other countries. As Box 6-3 discusses, the model does seem to have considerable applicability, although there are wide differences in the ways children of different cultures organize their secure-base behavior.

The Parents' Role in the Quality of Attachment

We have said that attachment is a *relationship* developing out of the interaction between infant and parent. Both parents and infants contribute to the nature of the attachment relationship, and we begin, in this section, by considering the parents' input. We will explore ways that parents influence other aspects of development in Chapter 11. We look at the baby's contribution to the relationship in the section that follows.

STYLES OF CAREGIVING Ainsworth was the first to describe how parents' styles of interacting with their infants are linked with the kinds of attachment relationships that infants and parents develop. Mothers of securely attached infants, for instance, usually permit their babies to play an active role in determining the onset, pacing, and end of feeding early in life. This behavior in and of itself doesn't promote a secure attachment, but it identifies a mother as generally responsive to her baby's needs. The mother of a securely attached infant is also consistently available to her baby; she does not sometimes ignore her baby when he or she signals a genuine need for her (Belsky, 1999; Braungart-Rieker et al., 2001). This style of parenting, called **sensitive care**, is widely associated with the formation of secure attachments. Moreover, this link between sensitive parenting and attachment security is evident in many cultures such as Australia, Brazil, and South Africa (Harrison & Ungerer, 2002; Posada et al., 2002; Tomlinson et al., 2005).

A number of parenting styles are associated with insecure attachments. Cassidy and Berlin (1994), for example, have found that mothers of babies with an insecure-avoidant type of attachment tend to be *unavailable* and *rejecting*. These mothers are generally unresponsive to their infants' signals, rarely have close bodily contact with them, and often interact with them in an angry, irritable way. And the parents of infants with insecure-resistant attachments exhibit an *inconsistently available* parenting style (Belsky, 1999; Thompson, 2006). Mothers who display this style respond to their babies'

needs at times, but at other times, they do not, and in general, they offer little affection and are awkward in their interactions with their infants.

The most deficient forms of parenting are found among parents whose attachment with their infants is of the insecure-disorganized type; these parents often neglect their babies or abuse them physically. The **approach/avoidance behavior**—the tendency to show an alternating pattern of approaching a person or object and retreating or escaping from it—that infants with this type of attachment display when reunited with their care-givers in the Strange Situation may actually be an adaptive response; these babies do not know what to expect, given the abuse they have already suffered (Solomon & George, 1999). Carlson et al. (1989) found that mistreated infants were significantly more likely to develop insecure-disorganized attachments (82%) than were children who were not mistreated (19%). Another factor often associated with this pattern of attachment is maternal depression. Babies of depressed mothers show not only approach/avoidance behavior but also sadness upon reunion. Observations of such mothers with their 6-month-old babies have revealed little mutual eye contact and minimal mutual respon-siveness; instead, mother and baby each tend to avert their gaze (Field, 1990; Greenberg, 1999). The presence of a nondepressed caregiver such as a father can, in part, mitigate the negative effects of maternal depression on infant's development (Hossain et al., 1994). Studies of the Dogan, who live in Mali, West Africa, suggest that frightening or frightened maternal behavior is linked with disorganized attachment patterns—a find-ing similar to those reported in the United States and the Netherlands (Lyons-Ruth & Jacobvitz, 1999; True et al., 2001). In this situation, as in the case of abuse, the parent is seen as a source of both comfort and fear, which leads to the infant's disorganized behavior.

Being reared in an institution or orphanage may lead to high levels of disorganized attachment as well (Zeanah et al., 2005). The style of caregiving, which includes a lack of eye contact, mechanical interaction patterns with little talking, slow responsive-ness to child distress, and ineffective soothing, probably contributed to these unhealthy attachment classifications. Another reason for this pattern of attachment observed in these institutionalized infants may be due to hormonal differences that may interfere with the development of attachment. Recently, researchers (Fries et al., 2005) found that 4-year-olds who had lived in Russian or Romanian orphanages before being adopted by U.S. families had lower vasopressin levels, which plays a role in recognition of familiar people than noninstutionalized children. As we saw in Chapter 5, early experience can alter our brain chemistry and, in turn, affect our capacity for social ties.

Maternal unresponsiveness to infant signals can play an important role in the emer-gence of an insecure attachment, just as a mother's sensitivity to her baby's needs can help promote secure attachment. This was shown in a longitudinal study in which infants and their mothers were observed in their homes at 1, 3, and 9 months of age to assess the mother's general responsiveness to the child (Belsky, 1999; Isabella, 1993). At 12 months, the quality of the mother-infant attachment was assessed in the Strange Situation. Securely attached babies had more synchronous patterns of interaction with the mother (even at 1 and 3 months of age) than did insecurely attached babies. The mother-infant interactions of the insecurely attached children were more one-sided, unresponsive, or intrusive. Mothers of insecure-avoidant infants, for instance, were ver-bally intrusive. They continued to talk to the baby even when the child signaled a lack of readiness to tolerate more verbal stimulation. Mothers of insecure-resistant infants were generally unresponsive as well as underinvolved.

Attachment processes do not cease in infancy but continue to be important in later phases of development such as adolescence. Just as infants gain comfort from using mother as a secure base, adolescents continue to find value in the quality of the attach-ment relationship with their mothers. When the mother was supportive and attuned to the adolescent's needs and self-perceptions and when the mother and adolescent were able to maintain their relationship through disagreements, the adolescents' attachment relationship with their mother was more secure (Allen et al., 2003). Just as a secure base

approach/avoidance behavior A pattern of inter-action in which the infant or child shows an inconsistent pattern of approaching and retreating from a person or an object.

BOX 6-3

Perspectives on Diversity

ATTACHMENT TYPES IN DIFFERENT CULTURES

Can Ainsworth's Strange Situation be used in cultures other than the United States to assess the character of children's relationships with their parents? For example, do secure, avoidant, and resistant mean the same things in Ganda that they mean in the United States? If mothers and fathers in Norway encourage their young children to develop independence earlier than U.S. parents, how may this affect the interpretation of "avoidant" behavior on a child's reunion with parental figures? A number of researchers have addressed these and other questions relating to the universality of Ainsworth's concepts. They have found that although the attachment categories seem to have considerable applicability across cultural groups overall, important variations do occur in the way infants of different racial-ethnic groups express secure and insecure attachment relationships.

Another important question is the origin of particular attachment behaviors and relationships. According to Thompson (2006), parental solicitude is affected not only by personality factors and personal belief systems but also by such things as the availability of environmental resources and a parent's degree of freedom to care for a child rather than be stressed or exhausted by the effort to obtain the necessities for survival. On this view, all three major types of attachment can be seen as adaptive responses by infants to parental investment patterns. Thus, in assessing attachment behaviors among parents and children in the resource-poor environments found not only in developing countries but also in areas within more developed nations, it is important to consider the many factors that may contribute to attachment behavior.

Secure Attachment Relationships

When babies are accustomed to almost constant contact with their mothers, they may react differently to reunion in the Strange Situation, either not seeking contact or failing to be comforted by it, and because behavior at reunion is the primary basis for determining attachment classifications, understanding cultural variations in caregiving is crucial. Secure attachments may be present even when infants' behavior in the Strange Situation at first seems to indicate otherwise.

For example, the Ganda infants Ainsworth studied showed more distress in response to brief separations from their mothers than U.S. babies, but on investigation, it was revealed that separations of only a brief period of time are infrequent in this African society. Ganda mothers leave their babies for hours at a time while they work in their gardens, and other relatives look after the children in their absence (Colin, 1996). Thus, when they left their babies in the experimental situation, the infants expected a long absence and reacted accordingly.

In the United States, most 1-year-olds are encouraged to engage in activities by themselves—to play with toys, exercise motor skills, and even to nap alone. Few U.S. parents bring their babies into their own beds, but in many parts of the world, it is common for infants to sleep with their parents. For example, babies in Japan usually sleep in the same bed with their mothers, and parents don't hesitate to take a child into their bed when the youngster cries or asks to be fed (van IJzendoorn & Sagi, 1999). Infants in Japan show much stronger reactions to the departure of the mother than U.S. babies do.

Distinctive reactions to the Strange Situation are also found among ethnic groups within the United States. For example, European American mothers tend to stress active, exploratory behavior, personal development, and self-control in their infants, whereas Puerto Rican mothers are more likely to stress close contact, quietness, responsiveness, and respectfulness in their infants (Harwood, Miller, & Irizarry, 1995). As a result, European American babies may appear avoidant in comparison with Puerto Rican infants.

Avoidant Attachment Relationships

In Germany and Sweden, evidence of avoidant relationships is seen more often than in the United States, reflecting the fact that parents in these countries tend to stress early independence somewhat more than American parents do (Colin, 1996; Grossmann et al., 2005). And according to Schaffer (1996), infants in Great Britain are also more likely to evidence avoidant relationships than U.S. babies, though not as likely as German infants (Grossmann et al., 2005). These tendencies appear even among babies showing secure

attachment. For example, secure infants in the Netherlands use their mothers as a secure base while interacting across a distance, whereas in the United States, secure-base behavior involves close physical contact both initially and on reunion (van IJzendoorn & Sagi, 1999).

In contrast, avoidant reactions are uncommon among Japanese babies, partly because children in Japan are socialized to maintain harmonious personal relationships; ignoring or turning away from someone would be considered rude (Colin, 1996). Moreover, in one Japanese study, most mothers rushed to pick up their infants on reunion, before the babies could give any sign that they wanted contact. Presumably, these mothers hurried to alleviate the distress they assumed their babies were experiencing.

Resistant Attachment Relationships

Japanese and Israeli babies seem more likely than American infants to show resistant behavior in both phases of the Strange Situation. In the case of the Japanese infants, this may well be because they are in close contact with their mothers from the time they are born, including, as we've noted, sharing their parents' beds (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). For these infants, the stress of separation seems much greater than it is for Western babies.

Babies living on Israeli kibbutzim probably show resistant attachment behavior in the Strange Situation for different reasons. Although an infant Israeli "kibbutznik" is usually raised by a hired caregiver (in Hebrew, a *metapelet*), this person is not always highly motivated to engage in infant care and, typically having responsibility for three children, may be unable to respond sensitively to each of them in optimal fashion (Aviezer et al., 1999; Sagi-Schwartz & Aviezer, 2005). The child customarily spends only a few hours with her parents, at supper time, and unless she sleeps at home, she may be watched at night by a person who must monitor all the babies in the nursery building. As a result, "even secure attachments might be expected often to be tinged with resistance and/or preoccupation with the caregiver, who may often have been unavailable" (Colin, 1996, p. 155).

Can We Rely on the Strange Situation in Cross-Cultural Contexts?

In view of the foregoing findings, we may ask whether the Strange Situation is truly applicable to assessing attachment relationships in babies of other cultures. Given the cultural practices we've described that either neutralize the effects of separation or make it excessively threatening, it can be argued that this measurement device needs revision or replacement.

Does the fact that children from Germany and Sweden who may be well adjusted in terms of their upbringing nevertheless appear to have avoidant—and thus, by definition, insecure—attachment relationships undermine the usefulness of the assessment in those cultures? And perhaps the test situation is just too stressful for Japanese and Israeli babies. Several researchers have argued that as long as the experimenter shortens separation episodes for babies who are highly distressed by the scenario, the procedure probably produces valid classifications across cultures. Or possibly new approaches that we discussed in the text, such as the California Attachment Procedure (CAP), will be useful in cross-cultural studies because they avoid stressful separation episodes (Clarke-Stewart et al., 2002).

The newer Attachment Q Sort (AQS) allows for more input by infants' caregivers into the assessment process, but even this device may be culture bound. Although Posada and colleagues (1995) found considerable overall cross-cultural consistency in their study of mothers' Q sorts in China, Colombia, Germany, Israel, Japan, Norway, and the United States, they report that sociocultural similarity both within and across cultural groups was modest and that there is considerable diversity in the ways that children behave in separation situations. The issue of multicultural applicability of attachment assessment measures may remain unresolved until researchers undertake multiple naturalistic observations of infant-caregiver dyads in many cultures and social contexts (Sagi-Schwartz & Aviezer, 2005; van IJzendoorn & Sagi, 1999).

allows the infant to begin to explore her physical world, a secure base as expressed by a positive and supportive mother-adolescent relationship allows the adolescent to explore independence in ideas and behaviors. The forms of attachment relationships shift across development, but the fundamental dynamics remain the same.

What can we learn about attachment from infant-parent interactions in other cultures? An interesting comparison can be drawn between U.S. parenting styles and those of Israeli parents, some of whom live with their families in a kibbutz, or communal village, where they generally rear their infant children in group-care arrangements. In all kibbutzim (plural of kibbutz), babies stay in the infant-care center during the day, and in some, they stay in the center even at night, but in others, they spend the night with their families. Sagi and his colleagues (Sagi et al., 1994), using the kind of natural experimental design we discussed in Chapter 1, examined the effects of these contrasting child-rearing arrangements on attachment relationships. Some of their results are summarized in Table 6-7, which shows that infants who slept at home with their families were more likely to develop secure attachments than babies who spent the night in the infant center. As you can see, among the children who spent the night at home, the secure and insecure-resistant attachment groups represented proportions similar to those of the American groups that we've already mentioned. Note that no infants were classified as having insecure-avoidant attachments. Babies reared in kibbutzim rarely exhibit such attachments because kibbutzim caregivers seldom exhibit rejecting behavior or pressure children to act independently (Sagi-Schwartz & Aviezer, 2005). The differences observed between the sleep-at-home and sleep-at-the-kibbutz babies were not related to any other factors, for the researchers equated their young participants on such things as temperament, early life events, mother-infant interaction in play, quality of day-care environment, and maternal characteristics such as job satisfaction and anxiety about separation from children. The researchers suggest, therefore, that it may have been the mothers' greater opportunity to respond sensitively to their babies' needs during the evening and nighttime hours that increased the mothers' overall sensitivity to their infants (Sagi-Schwartz & Avieser, 2005).

Even more convincing evidence of the impact of maternal sensitivity on the attachment relationship comes from an experimental study in the United States by Anisfield and coworkers (1990). Lower income inner-city mothers of newborns were divided into two groups: An experimental group received soft baby carriers, and a control group was given rigid carriers of the "car seat" type. The researchers predicted that the soft infant carriers would increase physical contact between infants and mothers and facilitate the development of maternal responsiveness; in fact, the mothers given the soft carriers were indeed more responsive to their infants' vocalizations at 3.5 months. Moreover, attachment measured at 13 months was affected as well: 83% of the babies in the experimental group were securely attached to their mothers, whereas only 39% of the control group babies were securely attached to their mothers.

Of course, relationships between parents and infants do not develop in a vacuum. They are affected by and affect other relationships among family members, as well as relationships outside the home. For example, there is a link between marital adjustment and infant-parent attachment: Secure attachment is more likely when marital adjustment is good (e.g., Belsky, 1999; Thompson, 2006). Although the birth of a child is generally associated with a decline in marital satisfaction (Cowan & Cowan, 2000),

Table 6-7

Attachment in children raised in an Israeli kibbutz

Source: Adapted from Sagi, van IJzendoorn, Aviezer, Donnell, & Mayseless, 1994.

Attachment Type	Children Who Spent the Night		All Children
	In the Care Center	At Home	
Secure	6 (26%)	15 (60%)	21 (44%)
Insecure-avoidant	0	0	0
Insecure-resistant	7 (30%)	2 (8%)	9 (19%)
Insecure-disorganized	10 (44%)	8 (32%)	18 (37%)

mothers whose infants become securely attached usually report less dissatisfaction with their marriages than mothers whose children are insecurely attached (Belsky, 1999). As you will see when we discuss the family in Chapter 11, marital and parent-child relationships are often closely connected.

IS THERE INTERGENERATIONAL CONTINUITY IN ATTACHMENT?

The kind of care that parents received when they were infants is another influence on the quality of attachment that develops between them and their own children (Bretherton & Munholland, 1999; Thompson, 2006). From our mothers and fathers, we all acquire what Bowlby (1973) calls **internal working models** of the self and parents. According to Bowlby, these models are mental representations about oneself, one's own parents, and the styles of interaction one experienced as a child. Working models are also often referred to as *attachment representations*. Note that it is not the actual experience of the parent when she was an infant that forms this model but rather how she reconstructs or interprets these early experiences. Because of these internal working models, people tend to re-create their own childhood relationships when they themselves become mothers or fathers (Bretherton, 2005).

To investigate this notion of intergenerational continuity, Main and her colleagues (Main et al., 1985; 2005) interviewed 40 middle-class mothers about recollections of their own relationships with their mothers during infancy and childhood. Supporting Bowlby's theory, the mothers' memory patterns did relate to the quality of their current attachment relationships with their own infants. As Table 6-8 shows, Main classified the women into three groups: autonomous, dismissing, and preoccupied. The *autonomous* group, who had developed secure attachment relationships with their infants, revealed in their interviews that although they valued close relationships with their parents and others, they were at the same time objective. They tended not to idealize their own parents but had a clear understanding of their relationships with them and were able to describe both their positive and negative aspects even if the relationship was strong enough to overcome any weaknesses. The *dismissing* group, who had avoidant attachment relationships with their babies, had a different set of memories; they dismissed and devalued attachment and frequently claimed that they couldn't recall incidents from their childhoods. On the other hand, the recollections they did report were often of idealized parents: "I had the world's greatest mom!" The third, *preoccupied* group was made up of the parents of resistant infants. Preoccupied with earlier family attachments, these mothers recalled many conflict-ridden incidents from childhood but couldn't organize them into coherent patterns.

Intergenerational continuity is not always straightforward, for some children and adults are able to overcome early adversity and insecure attachments and eventually develop satisfying interpersonal relationships with their spouses, partners, and offspring. Several cross-sectional studies have supported the existence of this resilient group of individuals, now called "earned secure" people (Paley et al., 1999). Roisman and colleagues (2002), who used data from a 23-year longitudinal study, showed that

internal working model
According to Bowlby, a person's mental representation of himself as a child, his parents, and the nature of his interaction with his parents, as he reconstructs and interprets that interaction; also referred to as an *attachment representation.*

Attachment category		Mother-Child Relationship
Mother	**Child**	
Autonomous	Secure	Mother's mind not taken up with unresolved concerns about her own experience; mother thus able to be sensitive to child's communications
Dismissing	Insecure-avoidant	Mother reluctant to acknowledge her own attachment needs and thus insensitive and unresponsive to child's needs
Preoccupied	Insecure-resistant	Mother confused about her attachment history and thus inconsistent in her interactions with her child

Table 6-8

Relationships between mothers' and children's attachment status

Sources: Hesse, 1999; Main, Kaplan, & Cassidy, 1985; Schaffer, 1996.

individuals can indeed overcome early problems and develop "secure" attachment relationships. Even though these young adults had negative childhood experiences, those who overcame their past and developed secure internal working models of attachment relationships had high-quality romantic relationships in their early 20s. The romantic ties of these earned secure young adults were comparable to those of individuals who were continuously secure and of higher quality than those of individuals with insecure attachments.

Additional support for intergenerational continuity comes from studies of other racial-ethnic groups and of parents in other countries. When Levine et al. (1991) studied a group of largely African American and Hispanic teen mothers, they found these mothers' attachment interview classifications to be reliable predictors of the attachment classification assigned to their relationships with their infants. And in Germany Grossmann and colleagues (2005) found strong links between adults' recollections and their attachment relationships with their infants. In Israel, Scharf (2001) found that adolescents who had been reared in a kibbutz communal setting, including overnight sleeping in the kibbutz, differed from family-raised adolescents in their attachment representations or working models of relationships. The kibbutz group had a higher incidence of nonautonomous attachment representations and were less competent at coping with imagined separations than family-reared adolescents. Adolescents in the kibbutz, whose parents had switched to family sleeping arrangements when the children were between ages 3 and 6, did not differ from family-reared adolescents in terms of attachment representations. This suggests that children's working models can shift in response to changing circumstances (Bretherton, 2005).

Perhaps the most convincing evidence of intergenerational continuity comes from Fonagy and his colleagues (1991), who interviewed pregnant women about their attachment histories and then measured infant-mother attachment when these women's babies were 1 year of age. This research design enabled the investigators to rule out the possibility that a parent's current experience with her baby was shaping her memories of her own childhood. Once again, these researchers found strong support for the relations between parental recollections of childhood family relationships and the attachment relationship between the women and their children.

The Effect of Infant Temperament

As you learned in Chapters 2 and 4, some babies are more difficult to interact with and care for than others. Might this affect the quality of attachments that these infants develop? Although attachment is a process of mutual influence, researchers have paid less attention to the infant's contribution than to the parental one. Some, however, have found a link between certain temperament characteristics in infants and the kinds of relationships they develop with their parents. For instance, irritable newborns or those with difficulties orienting to people and to objects may be more apt to develop insecure attachments (Spangler & Grossman, 1993; Susman-Stillman et al., 1996). Perhaps these early difficulties reflect underlying problems in adaptive mechanisms that continue to influence a child's behavior and interactions with others as he matures. Similarly some (Hinde-Stevenson, 2005) suggest that children who are shy and fearful may fail to develop secure attachment due to their inability to openly express their emotions while interacting with their caregivers. We must be cautious in drawing such conclusions, however, because many other researchers have failed to find clear links between early infant temperament and later infant-parent attachment (Thompson, 2006; Vaughn & Bost, 1999).

If infant temperament does have some influence on the development of attachment, that influence is probably mediated by many other factors. A "difficult" infant isn't necessarily destined to have a poor relationship with her parents. Parents who have a difficult or irritable baby can usually cope successfully if they receive help and support

(a)   (b)

Some babies are fussy and difficult no matter how lovingly parents care for them (a), and others are easygoing right from the start (b).

from other family members and friends. When adequate social support is available to the mother, an irritable baby is no more likely to become insecurely attached than a nonirritable one (Crockenberg, 1981; Van den Boom, 1994). If a mother is socially isolated or has poor relationships with other adults, however, she is more likely to have problems fostering secure attachment in a difficult infant (Levitt et al., 1986). Thus, the effect of temperament on attachment cannot be separated from the influence of the total social context in which the baby is developing (Sroufe, 1996; Thompson, 2006; Vaughn & Bost, 1999).

Stability in the Quality of Attachment

There is substantial stability in the quality of attachment from one period of time to another. As you saw earlier in the chapter, among infants tested with their mothers in the Strange Situation, the same attachment patterns were detected both at 12 months and at 6 years of age (Solomon & George, 1999). Although attachment behavior in these children at different points in time didn't correlate perfectly—for example, 100% of the children rated securely attached at 12 months were rated similarly at 6 years of age, but only 66% of the children rated insecure-disorganized at 12 months were rated similarly at 6 years of age—the overall findings support the notion that attachment behavior is highly stable. Lending cross-cultural support to this idea is a German study that found that first-year attachment classifications predicted 78% of sixth-year classifications (Wartner et al., 1994). Moreover, Waters and colleagues (2000) found that 72% of their sample classified as secure versus insecure in infancy were similarly rated 20 years later—an impressive level of stability of attachment across the life span. Even in adulthood, attachment representations tend to be relatively stable: 78% of couples received similar Adult Attachment Interview classifications before marriage and 18 months later (Crowell et al., 2002).

But general stability in the quality of parent-child relationships doesn't mean that change is impossible (Waters et al., 2000). In both the American and German studies, substantial minorities of children with insecure attachments as infants did manage to develop better relationships with their parents by school age. This is particularly likely when a child's parents begin to experience less stress in their lives (e.g., fewer financial worries or less marital tension) and so are able to become more available to their child and to interact in ways more responsive to the child's needs (Thompson et al., 1982). Alternatively, secure infant-parent attachment relationships can become insecure if the life circumstances of the family deteriorate due to job loss, divorce, illness, or abuse. More infants (44%) who later experienced negative life events changed attachment classifications from infancy to adulthood than children (22%) in families with no significant negative events (Waters et al., 2000).

Professional intervention can help improve a troubled parent-child relationship (Bakermans-Kranenburg et al., 2003). In a Dutch study, mothers who were taught to be more sensitive to their infants developed better attachment relationships with them than did the mothers of a control group of infants (van den Boom, 1994). Whereas 68% of the experimental group were classified as securely attached at 12 months of age, only 28% of the control group were securely attached. Another 58% were insecure-avoidant and 16% were insecure-resistant. Clearly, attachment relationships continue to develop and are responsive to changes in the behavior of both parent and child (Thompson, 2006; Waters et al., 2000).

The Consequences of Attachment Quality

Does the quality of an infant-parent attachment have serious implications for the child's development? As you will see, early interactions with attachment figures do indeed seem to shape children's continuing development, particularly their development of cognitive and social skills and a sense of self (Thompson, 2006).

COGNITIVE DEVELOPMENT   An early secure attachment appears to be related to more complex exploratory behavior at 2 years of age (Main, 1973). Moreover, as the child continues to develop, this intellectual curiosity is reflected in an intensified interest and enjoyment in solving problems. This positive approach to problem solving is seldom seen in toddlers who were insecurely attached as infants. Matas and colleagues (1978) found that securely attached 2-year-olds were more enthusiastic, persistent, cooperative, and effective in solving problems than their insecurely attached peers. The former group showed less frustration, less negative affect, less crying and whining, and less aggression toward their mothers. In addition, the securely attached toddlers engaged in more symbolic or pretend play—for example, transforming a block of wood into an imaginary car or a stick into a witch's broom. Nor are the effects of attachment status on cognitive outcomes restricted to infants and toddlers. High-quality parent-child relationships and higher early maternal sensitive responsiveness were linked with better cognitive development at age 7. In turn, attachment disorganization was linked with poorer cognitive outcomes (Stams et al., 2002). In this case, the relations were not due to shared genetic factors because the children were all adopted at an early age. In a longitudinal study in Reykjavik, Iceland, Jacobsen and Hofmann (1997) found that children who at age 7 were securely attached were likely to be more attentive and participative in the classroom at the ages of 9, 12, and 15. They maintained higher grades than children judged avoidant, ambivalent, or disorganized in their attachment.

It's not only mothers' and fathers' relationships with their child that are important to her or his cognitive development but the child's relations with other significant caregivers as well. A cross-national study in the Netherlands and Israel examined families of working parents who employed a third primary caregiver for child care (van IJzendoorn & Sagi, 1999; van IJzendoorn et al., 1992). The quality of the whole attachment network (mother, father, others) in infancy predicted the children's intelligence scores when they were 5 years old; the greater the attachment security, the higher the test score.

These studies underscore the link between the quality of the parent-child relationship and cognitive development—but they do even more: They also point out that the success of adult experts in facilitating children's learning, as proposed by Vygotsky, may, at least in part, depend on the quality of the attachment relationship. (We introduced Vygotsky's theory in Chapter 1 and will revisit this theory in more detail in Chapter 8.)

SOCIAL DEVELOPMENT   Many studies support the idea that the quality of the caregiver-infant relationship is important for later social development (Sroufe et al., 2005; Thompson, 2006). A recent longitudinal study in which children were traced

from infancy to age 19 illustrates the importance of the early attachment for later social behavior (Carlson et al., 2004; Sroufe et al., 2005). Securely and insecurely attached youngsters developed very different social and emotional patterns. At 4 to 5 years of age, teachers rated securely attached children as showing more positive emotions and as having greater empathy for others and more ability to initiate, respond to, and sustain interactions with other people. Securely attached children also whined less, were less aggressive, and displayed fewer negative reactions when other children approached them. Not surprisingly, their teachers rated them more socially competent and socially skilled and as having more friends than other children, and their classmates considered them more popular than others.

At 8 and 12 years of age, the securely attached continued to be rated as more socially competent, more peer oriented, and less dependent on adults. Moreover, they were more likely to develop close friendships than their less securely attached peers. Attachment history also predicted friendship choices: Children with secure attachment histories were more likely to form friendships with other securely attached peers. At age 19, the socioemotional functioning of those adolescents with a history of secure attachment was rated higher as well. In comparison with peers who had a history of insecure attachment, these young adults were more likely to have close family relationships, long-term friendships, sustained romantic involvement, higher self-confidence, and greater determination regarding personal goals. Others have found similar links between the quality of early attachment and later school-age peer competence and friendship patterns (Contreras et al., 2000; Schneider et al., 2001). The long-term consequences of attachment security are evident not just in biologically related families but also in families of adopted children. Infants who were adopted before 6 months of age and who developed high-quality infant-mother relationships and secure attachments were better adjusted socially at age 7 (Stams et al., 2002). This work underscores the importance for later adjustment of good early caregiving and suggests that the effect is not simply due to a shared genetic history.

Just as Bowlby argued, the links between attachment and social outcomes are forged by children's internal working models. In their longitudinal study, Sroufe and colleagues (2005) assessed children's cognitive working models of relationships at various times throughout childhood and adolescence. For example, in the preschool years, these researchers evaluated children's relationship expectations, attitudes, and feelings. Securely attached children's relationship models were characterized by expectations of empathy between play partners, a high expectation of sharing during play, and constructive approaches to conflict resolution (e.g., taking turns, seeking adult acceptance, getting another toy). During adolescence (age 12), securely attached children construed their friendships as close, emotionally connected, and skilled in conflict resolution. These investigators showed that cognitive working models and social behavior mutually influence each other across time. In other words, cognitive representations in the preschool period predict social behavior in middle childhood; in turn, the representations in middle childhood predict social behavior at 12 years of age, and these cognitive models predict social outcomes at 19 years of age. Moreover, across time, social behavior at one point predicts later cognitive representations. For example, social behavior in middle childhood influences a child's cognitive working models in early adolescence. Figure 6-8 depicts this pattern of across-time influence between cognitive and behavioral levels. Other studies find similar links between working models and social behavior with peers (Cassidy et al., 1996). Together, these studies illustrate the interplay among attachment, cognitive understanding, and children's social outcomes.

Emotions play a role in accounting for the links between attachment and social competence, too. For example, attachment to his mother affects the way a child processes emotional information and understands and regulates his emotions. Securely attached children tend to remember positive events more accurately than negative events, whereas insecurely attached children do the opposite (Belsky et al., 1996). And securely attached preschoolers are better at understanding emotions than insecurely attached
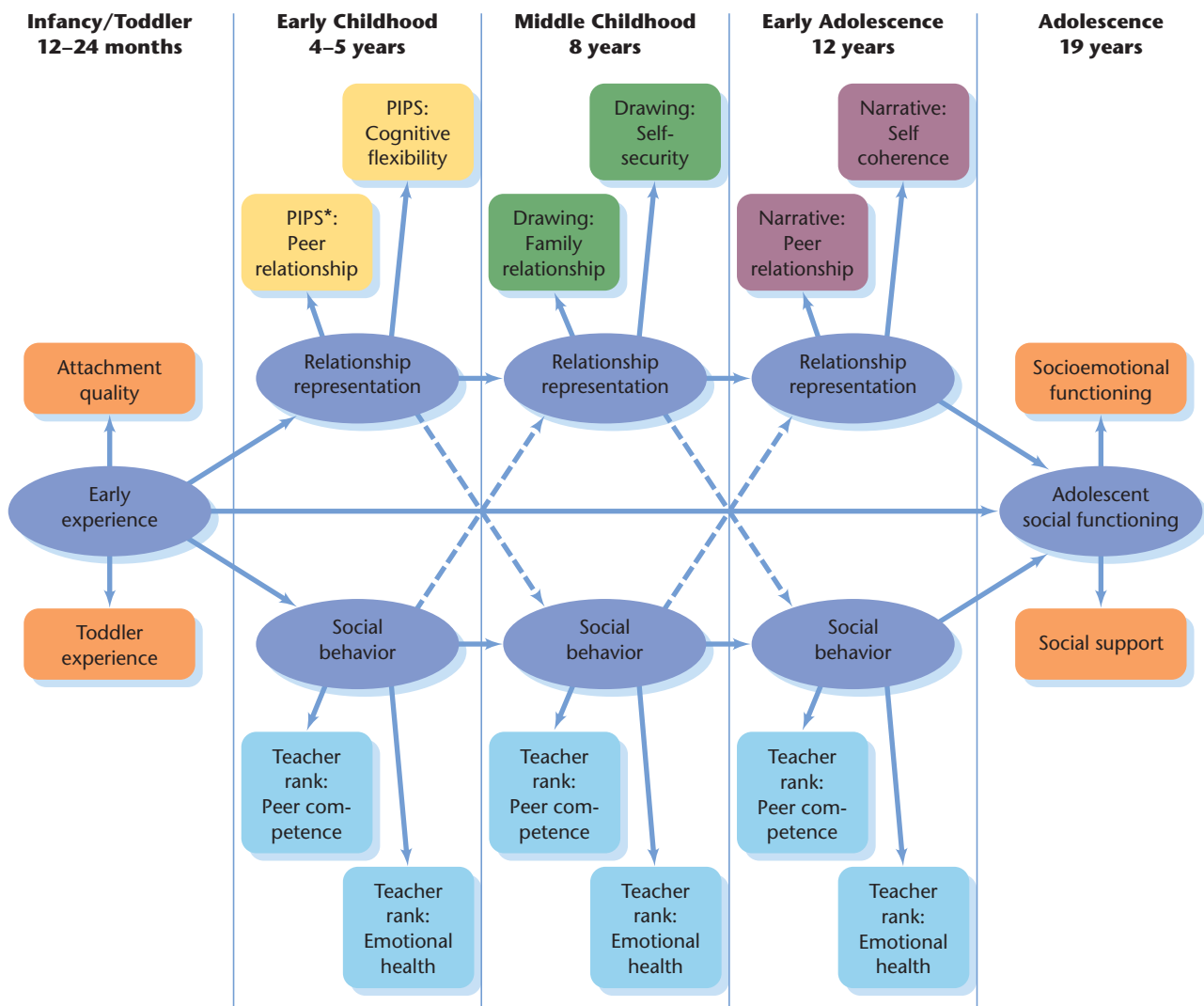
Figure 6-8

A model of across-time influence of social behavior and cognitive working models on children's adjustment

This model illustrates the ways that cognitive working models, or representations of relationships, influence each other across development. Together, earlier social behaviors and relationship representations influence social functioning in adolescence. Rectangles contain the specific measures used at each time point.

* PIPS: Preschool Interpersonal Problem Solving Assessment Interview.

Sources: Carlson et al., 2004; Sroufe et al., 2005.

children (Laible & Thompson, 1998). Finally, Contreras et al. (2000) found that securely attached children are better at regulating their emotions, which in turn accounted for their superior social relationships with peers.

In trying to understand children's social behavior, it is also important to consider both infant-mother and infant-father attachment relationships (Berlin & Cassidy, 1999; Lamb, 2004). Even very young children may develop different relationships with each parent. In a study of 1-year-old infants, Main and Weston (1981) classified babies according to whether they were securely attached to both parents, to their mothers but not their fathers, to their fathers but not their mothers, or to neither parent. To determine whether the infants' relationships with their mothers and fathers affected their social responsiveness to other people, Main and Weston then observed the infants' reactions

to a friendly clown. The infants who were securely attached to both parents were more responsive to the clown than those who were securely attached to only one parent and insecurely attached to the other, and the babies who were insecurely attached to both parents were the least responsive of all. These results suggest that a less-than-optimal relationship with one parent is offset by a better relationship with the other parent—and that therefore it is not enough to study just mothers or fathers alone. Viewing the parents as part of a family system is the best way to understand their role in child development (Parke & Buriel, 2006).

In summary, a healthy attachment to parents facilitates exploration, curiosity, and mastery of the social and physical environment. Early healthy attachment also increases the child's trust in other social relationships and permits the later development of mature affectional relationships with peers. Longitudinal studies aimed at defining the links between early parent-infant interaction and later relationships in adolescence and adulthood suggest the long-term stability of the cognitive and social effects of early attachment. Clearly, developmental history leaves its mark (Thompson, 2006).

THE SENSE OF SELF   The *sense of self*, or the awareness of the self as differentiated from other people, is crucial to the child's development (Harter, 1998, 2006). As this awareness evolves, it becomes increasingly complicated, incorporating notions such as self-concept, self-esteem, self-confidence, and self-respect, all of which comprise cognitive and social as well as emotional factors.

When do children begin to recognize themselves as different from other people? How does the complex network of feelings and cognitions associated with a person's sense of personal identity evolve? Babies as young as 18 weeks of age happily gaze at their reflections in a mirror, but not until they are well past 1 year old do they realize that they are looking at a reflection of themselves. A classic method of examining self-identity in the child has been to allow the child to look into a mirror for a bit and then to put a spot of rouge on the child's nose and return her to the mirror (Brooks-Gunn & Lewis, 1984; Lewis, 1991). We assume that if the child recognizes that the mirror reflection is of herself, she will be likely to touch her nose. Children under 1 year of age seem to believe that the reflection is another child and sometimes touch it or try to look behind the mirror for the other child, but they don't try to touch their noses (Brooks-Gunn & Lewis, 1984). Sometime during the second year of life, children begin to recognize their own images, and by the time they are 2, almost all children give evidence of self-recognition, giggling, showing embarrassment, or acting silly at the sight of their rouged noses (Figure 6-9). On average, children are 20 months old before they fairly consistently locate or touch the rouge on their noses. Later, they learn to use self-referent terms such as *I* and *me* and to distinguish themselves by age and gender. Table 6-9 presents the stages in the development of self-awareness in the first 2 years of life.

Is it possible that the sense of self develops in human children even earlier than 20 months? Some researchers have suggested that infants as young as 3 months may have some sense of self-awareness (e.g., Schaffer, 1996), and others have even suggested that a sense of self develops prenatally, citing the behavior of some infrahuman creatures that make clear distinctions between themselves and others (Angier, 1997). Still others (e.g., Porges, 2005), however, point out that a considerable difference exists between survival-adapted tendencies to look out for oneself and a real consciousness of that choice or of one's relationship to others.

However these complicated questions may be answered, we do have some evidence that the quality of the child-parent attachment relationship affects the child's developing self-concept. Moreover, the value that one places on the self varies with the quality of attachment (Thompson, 2006). In one study, Cassidy (1988) assessed the attachment relationships of 6-year-olds and the children's self-concepts. Children who were securely attached viewed themselves in a positive way, although they were able to acknowledge their less-than-perfect qualities. In contrast, insecure-avoidant children tended to present themselves as perfect, and insecure-ambivalent children showed

Figure 6-9

What's that on my nose?

When experimenters dabbed rouge on children's noses, in two separate studies the children showed similar behavior. Those less than a year old didn't recognize themselves in the mirror, but by the time they were 2, most children realized that mirror images of children with rouge on their noses were images of themselves.

Sources: Lewis & Brooks-Gunn, 1979; Schaffer, 1996.

Children recognizing themselves (percent)
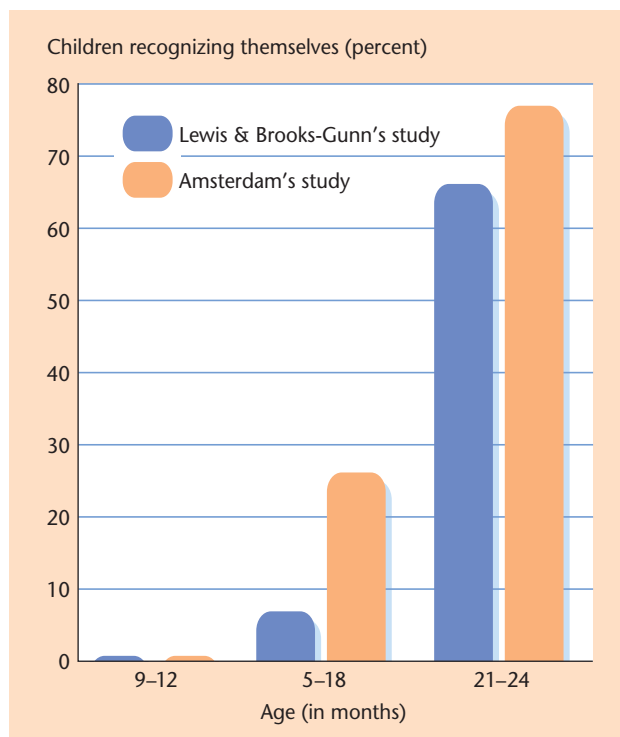
no clear pattern of responses. A group of children classified as insecure-controlling (similar to the insecure-disorganized classification discussed earlier) had negative self-concepts. These results strongly suggest that the quality of early attachment is related to the degree to which children view themselves positively and realistically; both of these capacities are important aspects of social adjustment.

MULTIPLE CAREGIVERS AND ATTACHMENT: THE EFFECTS OF CHILD CARE

In 2006, 65% of American children under the age of 5 had mothers who worked outside the home (Council on Contemporary Families, 2007) and 4 million children *under the age of 5* were being cared for by someone other than their parents (U.S. Bureau of the Census, 2002). Although many children of working parents are cared for entirely by their parents, siblings, and other relatives, over 50% of children under 5 spend some hours a week in some form of day care—that is, care provided by one or more non-family members in the child's own home, in the caregiver's home, or in an organized

Table 6-9

The early stages of self-awareness

Source: Schaffer, 1996.

Age in Months	Behavioral Indications
0–3	Infant shows interest in social objects but does not distinguish between self and other.
3–8	Child's first signs of self-recognition, based on contingency clues (fact that mirror image moves in tandem with child's movements), are tentative and unreliable.
8–12	Notion of self-permanence emerges. Child reliably recognizes self based on contingency clues, begins to use *feature clues* (child's own physical features as seen in video or photograph).
12–24	Basic self-categories, such as age and gender, are consolidated. Child reliably recognizes self based on feature clues.

child-care facility (see Figure 6-10) (Clarke-Stewart & Allhusen, 2005). It should be stressed that both parents often are forced to work to maintain the economic well-being of the family; thus, placing an infant or child in outside care is often a necessity rather than a choice.

According to John Bowlby, having not only parents but also a number of other caregivers share in caring for an infant may impair the quality of infant attachment. This proposition has been central to the controversy surrounding the advantages and disadvantages of child care for the infant's and young child's social development. There is no evidence that being in child care actually prevents the formation of an attachment between infants and their parents. Children who spend time in child care form close relationships with their mothers and fathers, just as children raised at home do (Clarke-Stewart & Allhusen, 2002, 2005; Lamb & Ahnert, 2006). As we saw earlier, children do show separation protest in response to being left by their parents even when they are clearly attached to them.

However, some evidence suggests that the *amount of time* children spend in day care does affect the nature of child-parent relationships (NICHD Early Child Care Research Network, 1997; 2005). In an extensive study of 1,300 families in 14 different locations in the United States, researchers found that the more time their children spent in day care, the less sensitive mothers were toward their infants at 6 months of age, at 15 months, and at 3 years of age. The study also found that children in day care were less affectionate toward their mothers at 2 and 3 years of age. These associations, however, were relatively weak. Recent evidence from Israel is consistent with the argument that not only the amount of time in child care but also child-care quality are important to consider in understanding the links between child care and attachment. In a large-scale study of over 750 infants age 12 months, Sagi and his colleagues (2002) found that infants in **center care**—an arrangement in which children are cared for in a "school-like" environment by professional caregivers—were more likely to be insecurely attached than infants cared for by mothers, other relatives, paid caregivers, or **family child care**, an arrangement in which an individual cares for three or four children in her home. Center care in Israel is of poor quality and has a high infant-caregiver ratio (i.e., each caregiver must look after a considerable number of infants), characteristics that account for the increased level of attachment insecurity among center-care infants.

Some earlier studies have suggested that infants who are in day care because their mothers are employed full time—especially babies who begin full-time day care before they're 1 year old—are more likely to be classified as insecurely attached than infants of nonemployed or part-time working mothers (Barglow et al., 1987; Belsky & Cassidy, 1994; Belsky & Rovine, 1988). Again, however, the correlations were not strong. Moreover, in a review of day-care studies, Clarke-Stewart (1989) found that although on

center care A child-care context in which children are cared for in a "school-like" environment by professional caregivers.

family child care A child-care arrangement in which an individual cares for three or four children in her home.

average 36% of the infants of full-time working mothers became insecurely attached, 29% of the infants of nonemployed or part-time working mothers also developed insecure attachments.

How might we explain why roughly a third of the babies of working mothers, regardless of whether they are in day care or are cared for at home, develop insecure attachments? It is of course possible that day-care babies are somewhat more apt to develop an insecure attachment because their mothers are less available to them or because they interpret her absence as rejection (Barglow et al., 1987; Belsky & Rovine, 1988). However, other explanations are also possible (Clarke-Stewart & Allhusen, 2005; Lamb & Ahnert, 2006). For instance, mothers who dislike caring for a baby (and who thus tend to be less sensitive caregivers) may be more inclined than other mothers to take full-time jobs. Or possibly, the stress associated with handling both a baby and work interferes with a working mother's ability to promote secure attachment. These alternative explanations suggest that day care itself may not exert an influence on attachment but rather that something associated with a parent's use of day-care facilities, such as holding a full-time job, may reduce parental effectiveness at being a consistently sensitive and responsive caregiver. As Clarke-Stewart (1989) puts it, it may not be that "40 hours of day care is hard on infants but that 40 hours of work is hard on mothers" (p. 270).

Thus, even with the latest findings on day care, it seems unlikely that day care alone is responsible for a lesser degree of security in these relationships (Clarke-Stewart & Allhusen, 2002). What's more, good day-care providers can sometimes compensate for less than optimal care from parents by giving children an opportunity to form secure attachments outside the home (Howes, 1999; Howes & Ritchie, 2003). Research shows that children with an insecure attachment to their mothers, but a secure attachment to a day-care provider, tend to be more socially competent than insecurely attached children who have not formed such a strong compensatory relationship outside the family. Interestingly, this positive effect of day care is not restricted to American children; similar findings have been recorded in the Netherlands and in Israel (van IJzendoorn & Sagi, 1999).

Stability of staff may be an important determinant of the relationship quality that emerges between care providers and children in day care. Barnas and Cummings (1994) found that 21-month-old toddlers more frequently sought out caregivers who had been on staff for longer periods of time and who were rarely absent and could thus be relied upon to be there for them. When the children were distressed, these familiar figures were able to soothe them more effectively than were caregivers whose employment records were unstable. Clearly, minimizing staff turnover is important to provide a stable, predictable environment for child care (Lamb & Ahnert, 2006). In addition, a training program aimed at improving the quality of care provided by family day-care providers can have a real impact on the attachment relationships developed between children and nonparental caregivers (Galinsky et al., 1995).

The higher the level of training of staff members, the more likely children are to develop secure attachment relationships with their caregivers (Clarke-Stewart & Allhusen, 2005). There are other important benefits of training as well. For example, children in high-quality programs are less likely to engage in delinquent and other antisocial behavior as they grow up, and they are less likely to need special education later on or to be retained in a grade. Kindergarten teachers have estimated that one in three children enters the classroom unprepared to meet its challenges (Lamb & Ahnert, 2006), and inadequate day care for preschoolers may be among the factors responsible for this finding. Another difficulty is that good day care is far more accessible to the affluent than to low-income families (Figure 6-11). This problem may worsen as a result of the 1996 federal welfare law that replaced Aid to Families with Dependent Children (AFDC) with a new program called Temporary Assistance for Needy Families (TANF). The newer program requires parents of all but the very youngest children to work and thus will increase the demand for day-care facilities (Children's Defense Fund, 1997). Some states have taken action to fund additional assistance for children. Partnerships among
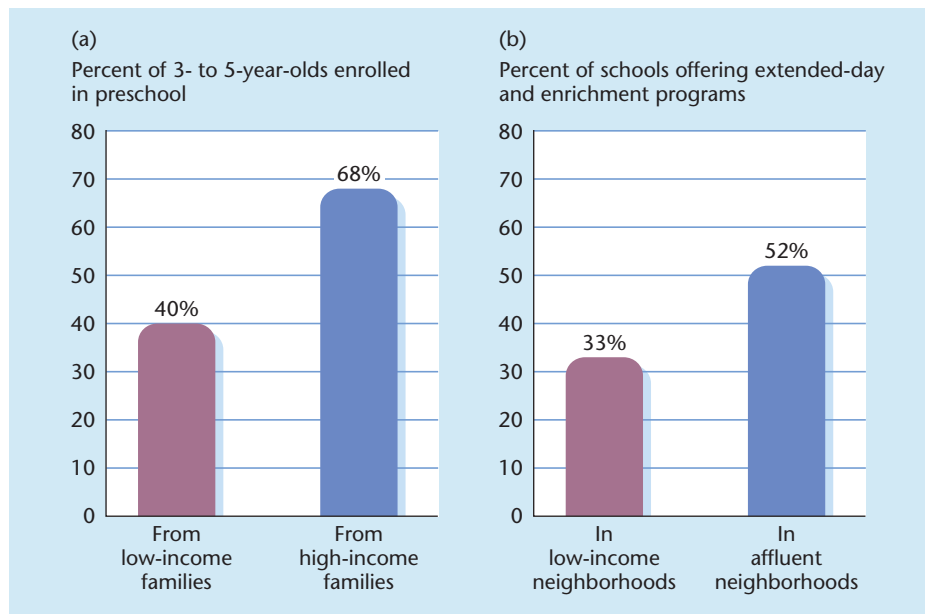
the state, the business community, and parents like those provided for by Florida's Child
Care Partnership Act and the Early Childhood Initiative undertaken in Pennsylvania's
Allegheny County look promising. Other states, however, have elected less farsighted
programs—for example, licensing child-care providers who lack even a high school
diploma or a GED (Children's Defense Fund, 2006).

Good-quality child care tends to enhance children's language abilities and cognitive
skills, and infants with child-care experience adapt more quickly and explore more in an
unfamiliar setting (Clarke-Stewart & Allhusen, 2005). These children play more with
peers and are more socially competent, and they exhibit more self-confidence and are
less fearful of unfamiliar adults (NICHD Early Child Care Research Network, 2001),
especially when they have a secure infant-care provider relationship (Howes & Ritchie,
2003).

At the same time, it's true that child-care children are often reported, at the age of
4.5 and in kindergarten, to be more aggressive and less compliant than their home-
reared peers. As the amount of time in nonmaternal care increased, there was more

These infants and toddlers
may learn important social
and cognitive skills in this
multicultural day-care facil-
ity. Especially in small centers
with favorable staff-child
ratios, age-appropriate
activities, and responsive
caregiving, day care can be a
positive and enriching experi-
ence for young children.

Making the Connections 6

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 6 and discussions in other chapters of this book.

	Understanding multiple emotions is linked with theory of mind. In Chapter 8, "Cognitive Development: Piaget and Vygotsky," p. 294
Chapter 6 Emotional Development and Attachment	**Emotional regulation and close attachments with parents are linked with better peer relationships.** In Chapter 12, "Expanding the Social World: Peers and Friends," p. 454
	Guilt is linked with higher level moral development. In Chapter 14, "Morality, Altruism, and Aggression," pp. 520–521

assertiveness, disobedience, and aggression (NICHD Early Child Care Research Network, 2002, 2003). However, these rates of aggression and noncompliance are within normal ranges and do not indicate that child-care children are, in any sense, socially maladjusted (Lamb & Ahnert, 2006).

One reason for the increased levels of aggression is that extended periods in child care may be stressful for some children. In one study, researchers measured salivary cortisol (levels of cortisol provide an index of stress) in children at child care or at home in the morning and late afternoon (Watamura et al., 2003). At child care, 35% of infants and 71% of toddlers showed a rise in cortisol across the day; at home, 71% of infants and 64% of toddlers showed decreases. Children who were better adapted to the child-care context, as evidenced by their greater involvement with peers, exhibited lower cortisol. Similarly, children at child care, who were rated higher in social fearfulness—which may interfere with the ability to play successfully with peers—exhibited higher cortisol levels and larger increases across the day. Clearly, some children fare better and cope more effectively than others with the group life of child care.

Of course, child-care quality is an important factor (Lamb & Ahnert, 2006). Optimal social development, as measured by better relationships with teachers and peers, is more often observed in high-quality day-care centers, where there are lower staff-to-child ratios, more interaction between staff and children, better caregiver training, more space, and better equipment than in poor-quality centers (Clarke-Stewart & Allhusen, 2005). Moreover, the effects of day-care quality continue even after children reach school age. In one study, high-quality preschool day care was related to less child hostility and better orientation to tasks in kindergarten. Poor-quality day care, however, coupled with early entry into day care (before the age of 1), was related to a higher level of destructiveness and less consideration for others (Howes, 1999; Howes & Ritchie, 2003). In another study, even 4 years after being enrolled in high-quality day care, children were rated friendlier, more inclined toward positive emotions, more competent, and better at resolving conflicts (Vandell et al., 1988). There is no question that day-care quality is associated with children's later social and emotional development, but the long-term effects are greater for children from disadvantaged homes (Clarke-Stewart & Allhusen, 2005).

SUMMARY

- Through emotional expression, infants not only communicate their feelings, needs, and wishes to others but even regulate other people's behavior. Primary emotions—such as fear, joy, disgust, surprise, sadness, and interest—emerge early in life and do not require introspection or self-reflection. Another set of emotions, the secondary, or self-conscious, emotions—such as pride, shame, guilt, jealousy, and embarrassment—emerge later in development and depend on our sense of self and our awareness of other individuals' reactions to our actions.

Early Emotional Development

- Some argue that emotions are learned, and others stress the genetic basis of emotions. Some view emotions as cognitively based. According to the functionalist view, emotions serve to help us to achieve our goals and adapt to our environment and to establish and maintain social relationships as well as regulate our emotional perceptions and expressions. This approach incorporates features of the learning and cognitive perspectives in a unified view of emotional development.

Development of Primary Emotions

- Babies begin expressing both positive and negative primary **emotions** quite early in life. Startle, disgust, and distress are among the first true emotions to appear. Next to emerge is the social smile, in which true pleasure is expressed. Smiling in infants follows a general developmental pattern, beginning with the newborn's **reflex smile**, which depends on the child's internal state. Next, at 4 to 6 weeks of age, come smiles elicited by external events, including social stimuli such as faces and voices. By 12 weeks, infants begin to smile selectively at familiar faces and voices, and their smiles differ depending on the situation. By 4 months, infants begin to laugh, and the number and kinds of events that elicit laughter change with their development. Both laughter and smiling may play a critical role in maintaining the proximity of the caregiver to the baby, and these are soon followed by delight, anger, joy, and surprise. Fear arrives a bit later, Although not all infants develop **stranger distress** in their second half year, when they do, the fear emerges gradually. Many factors determine how an infant will react to a particular stranger. Babies tend to be less fearful in a familiar setting and when they feel as if they have some control over the situation.

- Social referencing helps them interpret emotional cues in other people so as to know how to behave in a new situation. They also are less fearful of unfamiliar children than of unfamiliar adults, and they are less likely to be afraid of friendly, outgoing strangers.

- In general, emotions become more differentiated from one another over time and are more tied to specific situations.

Development of Secondary Emotions

- In the second year of life, the secondary emotions such as pride, shame, guilt, and jealousy develop. These emotions rely on the development of self-awareness and on the ability to entertain multiple emotions.

Individual Differences in Emotions

- Infants and children differ in their degree of sociability, wariness, and fearfulness as well as their degree of guilt and jealousy. These variations have important implications for children's later adjustment.

Recognizing Emotions in Others

- Another challenge that infants confront within the first half year of life is that of learning to recognize emotional expressions in others. Babies' typically easier recognition of positive emotions than of negative ones has functional value, for it strengthens the bond with mothers and other caregivers. In general, children are more proficient at producing than at recognizing emotions, but the two abilities are positively related: Children who are skilled at one are typically skilled at the other.

Emotional Regulation and Emotional Display Rules

- A major challenge for infants is to learn how to regulate their own emotions, to modify or control them when desirable. Gradually, emotional expressions become less frequent and less intense. By the preschool years, children begin to follow **emotional display rules**, which dictate what emotions to show under what circumstances.

- Culture affects these rules, and the display of such emotions as anger and shame may be sanctioned in one culture but disapproved of in another.

How Children Think About Emotions

- As children mature, they develop an understanding of the meanings of emotion terms and of the situations that trigger particular feelings; each **emotional script** within this collection helps the child identify the feeling that typically accompanies a given situation. They also learn that they can experience more than one emotion at a time and that two or more such emotions may conflict, and they begin to consider the desires of others in predicting the emotions that others will experience in particular contexts. Learning to differentiate and integrate multiple factors in a situation helps children to understand secondary emotions like pride, guilt, shame, and jealousy as do both the ability to understand causal sequences and specific experience in discussing feelings with caregivers and others.

The Family's Role in Emotional Development

- Family members, both parents and siblings, influence the child's developing patterns of emotional expression. Parents serve as models for emotional display, and by reacting to a child's emotional expressions, both parents and siblings can encourage or discourage such displays. Children whose parents serve as coaches, helping them to understand and manage their emotions, are better able to handle emotional upset on their own and in addition are better accepted by their peers. Belittling or dismissing a child's emotions or punishing her for her expressions may prevent her not only from learning how to manage her own feelings but also from understanding other people's emotions.

The Development of Attachment

- During the second half of the first year, infants begin to discriminate between familiar and unfamiliar caregivers and to form **attachments** to the important people in their lives. According to the **psychoanalytic** view, the basis for the mother-infant attachment is oral gratification. The **learning** view stresses the role the mother plays as a **secondary reinforcer**. The **ethological** view stresses the role of instinctual infant responses that elicit the parent's care and protection. Analogous to infant-parent bonding is the process of **imprinting**, which among birds and other infrahuman animals can forge bonds between newborns and anything they see just after their birth. According to the **cognitive developmental view**, the infant must be able to differentiate his mother from a stranger and must be aware that his mother continues to exist even when he cannot see her.

- Attachment emerges over the first 6 to 8 months in a consistent series of steps. The first step, which seems to be innate in newborns, is a preference for other humans over inanimate objects. The second step, which begins soon after birth, is learning to discriminate familiar people from unfamiliar ones. Finally, in the third step, babies develop attachments to specific people. These attachments are revealed in the infants' loud protests when attachment figures depart and their joyous greetings for caregivers when reunited with them.

- Infants develop attachment relationships not only with their mothers but also with their fathers, siblings, peers, and others. In many cultures, fathers have the special role of playmate in the development of their babies; fathers' play with infants tends to be physical, whereas mothers' play is quieter and more verbal.

The Nature and Quality of Attachment

- The quality of an infant's attachment can be assessed in a scenario called the **Strange Situation**, in which the child's interactions with the mother are observed under mildly stressful conditions. This scenario evolved out of the notion that infants use the adult to whom they've become attached as a **secure base**. Typically, some 60% to 65% of infants are classified by this method as **securely attached** to their mothers, whereas the rest fall into three categories of insecure attachment: **avoidant**, **resistant**, or **disorganized**. Attachment classifications generally remain stable over time unless major changes occur in the lives of family members.

- The **Attachment Q Sort (AQS)**, a newer method of assessing attachment, makes it possible to rate a broad range of attachment-related behaviors in a naturalistic setting.

- The quality of an infant's attachment to parents is determined by early parent-child interactions. Parents who display **sensitive care**, responding to their infant's needs and giving the baby a sense of control over the environment, seem to have more securely attached infants. behave

- Parents' **internal working models** of their own experience with their parents are likely to influence their attachment relationships with their babies. Both mothers and fathers who have been classified as autonomous, dismissing, and preoccupied have been shown to be more likely to have secure, avoidant, or resistant infants.

- A baby's temperament may play a role in the quality of the infant-parent attachment, but this occurs probably only in combination with other factors, such as the caregiver's behavior. Early attachments shape a child's later attitudes and behaviors. Children who were securely attached as infants are more likely than others to see themselves positively, to have high self-esteem, to be intellectually curious and eager to explore, and to have good relationships with peers and others.

- The quality of attachment is relatively stable across time, but changes in the environment may act to improve or reduce that quality, and professional intervention can help improve a troubled attachment relationship. Early secure attachment appears to be related to cognitive advancement and to the development of social skills. In addition, the more secure a child's attachment relationship, the more likely she is to develop a positive self-concept.

Multiple Caregivers and Attachment: The Effects of Child Care

- Although there is no evidence that having multiple caregivers or spending time in a child-care center prevents the formation of a secure child-parent attachment relationship, some studies have indicated that the amount of time spent in such care is negatively correlated with the sensitivity mothers express toward their children and the affection children show to their mothers. Other studies have indicated that infants of working mothers are slightly more likely to be classified insecurely attached than those of nonworking mothers, but the percentage difference is not large. It has been suggested that, rather than the mother's absence, it is the stress of working and also raising a child that interferes with the development of a strong attachment relationship.

- Quality and stability of child-care center staff are important ingredients in the security experienced by children in the care of these part-time caregivers. When quality of care is good, children may benefit both cognitively and socially.

- The quality of **family child care** is less certain, depending as it does on the one individual who cares for three or four children in such an arrangement.

EXPLORE AND DISCUSS

1. Our focus in this chapter has been on emotion. What role do you think families play in children's emotional development?

2. How does culture alter children's emotional development? Do you think children show the same emotions in all cultures? Explain your answer.

3. How important to the development of attachment are specific caregiver functions, such as feeding, diapering, and bathing? Do you think other kinds of activities, such as play, are important as well?

4. Because mothers are still the primary caregivers, will infants not develop attachments to other people, such as fathers, siblings, or grandparents?

5. Do you think spending time in a day-care center puts a child at risk for later problems of development, such as, for example, difficulty in forming close personal relationships with other people? If you were counseling new parents, what guidelines would you offer them with regard to choosing a suitable day-care center for their baby?

Jacob Lawrence (1917–2000). *Library II*, 1960.

Private Collection, New York.

7.

Language and Communication

Christa and her mother are talking about a recent event, a Halloween party that Christa, who is 19 months old, attended (from Engel, 1995).

Mother: (while looking at a doll clown) You looked like this. Remember the other day we dressed you up like this? Huh? Where'd you go? You went to a party? You went to a Halloween party. Remember? I put pom-poms on your dress?

Christa: Pom-pom.

Mother: Pom-poms. And d'you remember what you got at the party?

Christa: Pom-pom.

Mother: You got pom-poms, yeah. We fixed your pom-poms up when we came home. And what else did you get? A balloon?

Christa: Balloon.

Mother: And the pumpkin.

Christa: Pumpkin, pumpkin, pumpkin.

Mother: (pointing to a pumpkin on the table) There he is.

Christa: Pumpkin. (p. 132)

In this discussion, the mother contributes a large part of the conversation. She introduces the topic, connects it to a shared event, and reminds her child of her experiences. The child participates in several ways. She repeats words the mother uses that are interesting and important to her. She also answers questions, although she is greatly reliant on mother's help in doing so. By participating in this exchange, Christa is learning much about language and how to use it, such as turn taking, the question-answer format, and several new words. She is also learning about the kinds of ideas and events people find interesting to talk about, as well as how to use language to refer to a mental event, in this case a memory of a party.

Early conversations can also involve functional goals. For example, here 20-month-old Megan and her mother are playing with toys and other objects (from Budwig, 2002).

Megan: I want that one. (lifting the childproof container with the nut inside)

Mother: Oh you want that one, okay.

Megan: (tries to open container, fails) *My* open that!

Mother: What?

Megan: *My* open that, mommy. (handing container to mother)

Mother: Wanna open that?

Megan: Yeah.

Mother: (opens container) (p. 77)

Here the child wants to achieve a goal, but she is unable to do so. She uses language to make her desire known to someone who may be able to help her, her mother, and she and her mother have several exchanges to clarify exactly what it is that Megan wants.

Sometimes, conversations between young children and older children or adults focus on helping children learn language, especially conventional forms of speech in their community. Here is an exchange, observed by Watson-Gegeo and Gegeo (1986), between a 15-year-old Kwara'ae girl in the Solomon Islands and her 27-month-old brother, Fita.

Sister: Then when you're full you just speak like this, "I don't want any more now."

Fita: What?

Sister: "I don't want to eat any more now."

Fita: I don't want?

Sister: Then you just speak as I said, like this, "I don't want any more now."

Fita: I don't want.

Sister: "I'm full now."

Fita: Full now.

Sister: "I'm—I'm full, I don't want to eat any more now."

Fita: Don't want to eat any more now. (pp. 29–30)

Notice how the sister repeats the phrasing and encourages her brother as he repeats after her. Such exchanges help children learn how to communicate information that is important for everyday functioning in socially appropriate ways.

Language is one of the most complex systems of rules a person ever learns, yet children in a wide range of different environments learn to understand and use their native languages quite rapidly. Their ability to do this suggests that human infants are prepared in some way to acquire language skills. However, biological preparation is insufficient in that the language abilities the child develops must fit with the community in which he or she lives. Thus, a crucial part of language learning is the social support provided by others as children learn to speak and use language to accomplish their own goals.

language A communication system in which words and their written symbols combine in rule-governed ways and enable speakers to produce an infinite number of messages.

What is **language**? It is a system of communication in which words and their written symbols are combined in rule-governed ways that enable speakers to produce an infinite number of messages. Language serves a wide range of purposes for the developing child: It helps him interact with others, communicate information, and express his feelings, wishes, and views. Children can use language to influence other people's behavior, to explore and learn about their environment, and to escape from reality by using their imaginations (Halliday, 1975). Language helps children to organize their perceptions and thinking, control their actions, and even to modify their emotions.

An important part of children's language learning is the development of **communicative competence**, which is the ability to convey thoughts, feelings, and intentions in a meaningful and culturally patterned way (Haslett & Samter, 1997; Hymes, 1972; Schaffer, 1974; Tomasello, 2006). Communication is by definition a two-way process; we send messages to others and receive messages from them. Thus, using **productive language**, we produce communications, and using **receptive language**, we receive communications from others.

We start this chapter with an overview of the primary components of language; next we explore the dominant theories of how language develops in the infant and young child. Then we discuss the structure of language, including words, sentences, and grammar. After this discussion, we examine how children begin to understand and use language to communicate. Finally, we consider language development for children who are bilingual and learn two languages.

THE COMPONENTS OF LANGUAGE: PHONOLOGY, SEMANTICS, GRAMMAR, AND PRAGMATICS

Children learn about the sounds, meaning, structure, and use of language simultaneously. However, for purposes of study, scholars divide language into four main areas: phonology, semantics, grammar, and pragmatics.

Phonology, the system of sounds that a particular language uses, includes not only the language's basic units of sound, or **phonemes**, but also rules about how we put phonemes together to form words and rules about the proper intonation patterns for phrases and sentences. Phonemes are considered *basic* units of sound because they are the smallest sound units that affect meaning; changing a phoneme changes the meaning of a word. For example, by changing the initial phoneme in the word *bat*, we can make the very different word *cat*. By changing the middle phoneme, we can make yet another word, *bit*. A very important feature of phonologic rules is that they are *generative;* that is, they are applicable beyond the cases on which they are based. A native English speaker, for instance, knows that *kib* is not a word in English, but it is nonetheless a possible sound pattern in the language's system. In contrast, *bnik* is not possible in English.

The study of word meanings and word combinations is called **semantics**. Comprehension of language requires not only knowledge of specific words and their definitions but also an understanding of how we use words and how we combine them in phrases and sentences. Thus, as children mature intellectually, their semantic knowledge continues to grow. Even adults continue to expand their vocabularies as they obtain new knowledge. For example, a first-year psychology student must learn a whole new vocabulary of psychological terms.

Grammar describes the structure of a language and consists of two major parts: morphology and syntax. The subfield of grammar studies called **morphology** concentrates on the smallest units of meaning in a language, such as prefixes, suffixes, and root words. These units are called **morphemes**. Rules for altering root words to produce such things as plurals, past tenses, and inflections are part of a language's morphological system. **Syntax** is the aspect of grammar that specifies how words are combined into sentences. For example, each language has syntactic rules for expressing grammatical relations such as negation, interrogation, possession, and the arrangement of subject and object in a statement. The rules of syntax allow us to vary word order so that we are not limited to one way of saying what we mean, provided that what we say is still syntactically correct. For example, we can say, "After class, I went to the library

communicative competence The ability to convey thoughts, feelings, and intentions in a meaningful and culturally patterned way.

productive language The production of speech.

receptive language Understanding the speech of others.

phonology The system of sounds that a language uses.

phoneme The basic unit of a language's phonetic system; phonemes are the smallest sound units that affect meaning.

semantics The study of word meanings and word combinations, as in phrases, clauses, and sentences.

grammar The structure of a language; consists of *morphology* and *syntax*.

morphology The study of morphemes, language's smallest units of meaning.

morpheme A language's smallest unit of meaning, such as a prefix, a suffix, or a root word.

syntax The part of grammar that prescribes how words may combine into phrases, clauses, and sentences.

Siblings are often good teachers for younger children, encouraging them to look at and manipulate interesting objects and giving names to shapes, colors, and noises that toys make.

pragmatics A set of rules that specify appropriate language for particular social contexts.

and listened to some music," but the syntactically incorrect sentence, "I listened to some music after class and I went to the library," is ambiguous and unclear.

The fourth component of language, **pragmatics**, consists of rules for the use of language in particular contexts (Bates, 1999). Thus, pragmatics directly concerns effective and appropriate communication. For example, a child learns that certain forms of language are more appropriate in some situations. A child may have a better chance of getting what she wants if she asks a schoolmate, "May I have one of your crayons?" instead of demanding, "Gimme a crayon!" Researchers in pragmatics study these and other issues, such as how children learn to take turns speaking, to remain silent while others speak, and to speak differently in such different settings as the classroom and the playground.

THEORIES OF LANGUAGE DEVELOPMENT

As in many other subfields of child psychology, those who study language development debate how much heredity contributes to the development of language and how much children's experiences contribute to the ability to communicate by means of language. Most theorists today hold an interactionist view, recognizing the roles that both biological and environmental factors play in language development. To gain a full understanding of this interactionist approach, we first explore the environmental, or learning, view and then the biological, or nativist, view.

The Learning View: Claims and Limitations

Traditional learning explanations use the principle of *reinforcement* to account for language development. The learning theorist B. F. Skinner (1957) posited that parents or other caregivers selectively reinforce the child's babbling sounds that are most like adult speech. He argued that by giving attention to these particular sounds and showing approval when their baby utters them, parents encourage the child to repeat them. When the child repeats the sounds, the parents or caregivers approve again, and the child, in turn, vocalizes these particular sounds more often. Thus, according to Skinner, by giving their greatest approval to the infant's closest approximations to adult speech sounds, parents shape their child's verbal behavior into what increasingly resembles adult speech. Other learning theorists (Bandura, 1989; Bullock, 1983) propose that the child learns primarily through *imitation* or observational learning. According to this view, the child picks up words, phrases, and sentences directly by imitating what she hears. Then, through reinforcement and *generalization*, or applying what she has learned to new situations, the child learns when it is appropriate to use particular words and phrases.

Learning theory accounts, however, have not fared well as a sole explanation of language acquisition for several reasons. First, the number of stimulus-response connections—that is, specific linkages between a baby's vocalization and a parent's reinforcing response—that would be needed to explain language, even the language of a very young child, is so enormous that a child could not acquire them in a lifetime, not to mention a few short years. Second, naturalistic studies of parent-child interaction fail to support the learning theory account. For example, mothers are just as likely to reward their children for truthful but grammatically incorrect statements as they are to reinforce the children for grammatically correct utterances (Brown & Hanlon, 1970). Parents are concerned to teach their children acceptable behavior as well as correct

language. It is difficult to see, then, how reinforcement alone might account for how the child learns grammar (Brown, 1973; Pinker, 1994).

A third argument against a learning explanation is that we cannot predict the vast majority of language utterances from opportunities to observe specific utterances by others. For example, utterances that are closely tied to environmental cues, such as "Hello,'" "Watch out!" or "You're welcome," are relatively rare. For most sets of circumstances, language entails more creative responses than can be accounted for by a learning view. Fourth, learning theory accounts have not explained the regular sequence in which language develops. Children in our culture, and other cultures, seem to learn the same types of grammatical rules in the same order. For example, they learn active constructions before passive constructions: They learn to say, "Taisha and Neville prepared the posters for the class presentation" before they learn to say, "The posters for the class presentation were prepared by Taisha and Neville." Finally, the learning explanation basically portrays the child as playing a rather passive role in language development, although, as evidence we discuss later shows, the child plays an active and creative role in discovering and applying general rules of language.

For all these reasons, strict learning theory accounts of language acquisition are not considered viable. An alternative explanation—the nativist view—suggests that language acquisition unfolds as a result of the unique biological properties of the human organism.

The Nativist View: Claims and Limitations

Linguist Noam Chomsky (1968), the most influential advocate of the nativist position, proposed that children are born with an innate mental structure that guides their acquisition of language and, in particular, grammar. Chomsky termed this structure a **language acquisition device (LAD)**.

Nativists argue that the human child is biologically predisposed to acquire human language. Following from this assumption, nativists contend that because language ability is an inherited species-specific characteristic, all languages of the species must display universal features; that is, they must share certain basic characteristics. By examining features such as the sounds used in speaking, the way words are organized in sentences, and how meaning is determined in various languages, investigators have concluded that a set of common principles does underlie all human languages (Slobin, 1985, 1992). For instance, speakers of all languages create a vast number of spoken words by combining a relatively small set of the possible vocal sounds humans can make. Finally, all languages have grammars, and nativists claim these grammars share certain formal properties as well (e.g., the subject-predicate relationship).

Also, in support of their position, nativists point out that in many different cultures, normal children acquire language relatively quickly and learn it well (Maratsos, 1989; Meisel, 1995; Pinker, 1994). Even in situations in which children receive fragmented and incomplete environmental input, children can learn language. Thus, nativists argue that the child must be biologically prepared to acquire language. As Box 7-1 suggests, some of the most striking evidence for the possibility of an innate predisposition for language comes from the study of children who learn language even with restricted input.

Another source of support for the nativist view is evidence that human beings learn language far more easily during a certain critical period of biological development. A **critical period** is a time during which a child is sensitive to a particular environmental stimulus that does not have the same effect on him when he encounters it before or after this period. The critical period for language stretches from infancy to puberty. Before puberty, a child may achieve the fluency of a native speaker in any language without special training, but after puberty, it is extremely difficult to learn a first language (see Figure 7-1). Dramatic examples come from several famous case studies. In 1800, a 12-year-old boy was discovered living on his own in the woods near Aveyron, France.

language acquisition device (LAD) Chomsky's proposed mental structure in the human nervous system that incorporates an innate concept of language.

critical period A specific period in children's development when they are sensitive to a particular environmental stimulus that does not have the same effect on them when encountered before or after this period.

BOX 7-1
Child Psychology in Action

CAN CHILDREN CREATE NEW LANGUAGES?

The most striking evidence that children may possess an innate program or template for grammar comes from the work of Derek Bickerton (1983, 1990, 2008), who has studied creole languages around the globe. The **creole language** often arises in a context in which people who speak different languages for some reason end up together in a single culture. We see this, for instance, in Hawaii, the southeast coast of North America, New Orleans, the Caribbean, northeastern South America, Africa, islands in the Indian Ocean, Indonesia, and the Philippines, where peoples from countries of Asia, Africa, Europe, and the Americas came together and formed polyglot societies. Although the adults in these situations crafted a common language that could be used to communicate, this language, called *pidgin*, lacked grammatical structure. However, the children in these cultures, regardless of their parents' native languages, used a language derived from pidgin, called *creole*, which had a single structure and linguistic system. Moreover, the creole languages persisted into succeeding generations in similar form. How could the children of these different cultural groups have evolved languages that resemble each other if they did not possess some sort of inner template of a universal grammar?

In these multicultural societies, many of which were made up of people who were moved, oftentimes against their will, to labor on colonial plantations, communication began with the development of a pidgin language, a simplified linguistic system created out of two languages that suddenly come into contact with each other. As Table 7-1 shows, pidgin lacks grammatical complexity: Its sentences are often no more than strings of nouns, verbs, and adjectives. For

this reason and because pidgin is highly individualistic, varying from speaker to speaker, its usefulness is limited. Such limitations may be what led the children of pidgin speakers to develop the more complex type of communication represented by creole languages.

The language children in polyglot societies develop is much richer in grammatical structure than pidgin (Bickerton, 1983). And interestingly, creole languages that develop in different places throughout the world are very similar in their structure, regardless of the contributing languages! Even more remarkably, the speech of first-generation creole-speaking children does not differ from that of later generations of speakers, which suggests that the acquisition of this new language happens very rapidly. Together, the uniformity of language across speakers and geographical locales and the speed of language acquisition argue against any simple explanation that children who learn creole are simply borrowing from the contact languages in a haphazard fashion.

What are the implications of these observations for theories of language acquisition? According to Bickerton (1983),

> The evidence from creole languages suggests that first-language acquisition is mediated by an innate device . . . the device provides the child with a single and fairly specific grammatical model. It was only in pidgin-speaking communities, where there was no grammatical model that could compete with the child's innate grammar, that the innate grammatical model was not eventually suppressed. The innate grammar was then clothed in whatever vocabulary was locally available and gave rise to the creole languages heard today. (p. 121)

creole language A language spoken by children of pidgin-language speakers that, in contrast with pidgin, is highly developed and rule governed.

The boy had no language, and in spite of efforts by Jean Itard at the National Institute for Deaf-Mutes in Paris, the boy was able to learn only a few words. Although no one knows why the boy had such difficulty (e.g., he may have been impaired at birth), his case raises the question of whether language can only be acquired before puberty (Lane, 1976). In another, modern case, 13-year-old "Genie" was discovered to have been kept locked in a room by her mentally ill father from the time she was 18 months of age (Curtiss, 1989; Rymer, 1993). Although Genie was more successful in learning to communicate than the wild boy in France, she never acquired normal language. These cases strongly suggest a critical period for language acquisition (Hoff, 2005). Further support for the idea of a critical period of language learning is found among young children whose speech is disrupted by brain injury and who often recover their language capacity rapidly and completely. If the brain damage occurs after puberty, however, the

Table 7-1 Some utterances in Hawaiian pidgin English

Pidgin:	*Ifu laik meiki, mo beta make time, mani no kaen hapai.*
Direct translation:	If like make, more better make time, money no can carry.
Meaning:	"If you want to build (a temple), you should do it just before you die—you can't take it with you!"
Pidgin:	*Aena tu macha churen, samawl churen, haus mani pei.*
Direct translation:	And too much children, small children, house money pay.
Meaning:	"And I had many children, small children, and I had to pay the rent."

Source: From Bickerton, 1990.

A similar process appeared in the language development of a group of deaf children in Nicaragua. In 1977, Nicaragua opened its first school for deaf people. Before the school opened, the lack of an organized school system prevented the deaf from much interaction. In the school, children and adults were taught to lip-read and to speak Spanish. This approach yielded little success, but the students were also able to freely engage in gestural communication. Slowly, a rudimentary sign language emerged among the students. As new children of various ages entered the school, they learned this sign language from their peers. Senghas and Coppola (2001) investigated the complexity of this gestural language in relation to how long children were at the school and the age at which they entered the school. If the complex grammar of language was found only among the children, then they could conclude that the knowledge stemmed from innate abilities available to the child until he or she reaches the critical period. If the most complex components of the language were found only in adults learning the new sign language, they could conclude that higher cognitive levels are needed to grasp the hardest parts of language. The investigators found that the most complex patterns of speech originated in children under the age of 10 and that adults were unable to make use of these structures in either comprehension or production. Thus, children were able to create and learn gestures that conveyed complex linguistic structures, whereas adults who were past the critical period were unable to do so. This conclusion provides powerful support for the theory that humans are designed to learn language at an early age.

Our understanding of these processes is not complete, however. Some critics like Tomasello (1995) have argued that adult influences may play a role in the emergence of creole. And others argue that creole languages reveal the common uses of language across cultures rather than simply reflecting properties of the human mind (Jourdan, 1991). Finally, as Hoff (2005) points out, the fact that creole languages developed a long time ago makes it difficult to know exactly what processes underlie them. At this point, it seems that the interactionist view (see pp. 238–239), which suggests that both biological factors and environmental influences provide the best account of language acquisition, may offer a viable alternative explanation for the creole languages.

prognosis for the recovery of language is poorer. Nevertheless, the fact that there is considerable variation, even among adults, suggests that despite the existence of a critical period, other contributions are also important (Goodglass, 1993).

Often, people have cited the ability of animals to learn language as evidence against the nativist viewpoint, but the conclusions are mixed (Gomez, 2004). Determining whether animals other than humans learn language depends on the definition of language a scientist uses as well as on the assumptions about what goes on in the human mind when people use language. If one is to define language as a use of symbols as referents, then the average sheepdog is able to learn a language when it learns dozens of whistles for various actions. However, linguists consider many features when defining language, including the understanding of word order ("Bob hit Jim" as opposed to "Jim hit Bob"), and the creation of novel yet understandable speech—for example, by

Figure 7-1

It helps to learn a new language early in life

On a test of English grammar, native speakers of Chinese and Korean who had immigrated to the United States before they were 7 years old scored as well as native speakers of English. The older immigrants were when they arrived in America, the less well they did on the test.

Source: Newport, 1990; redrawn from Johnson & Newport, 1989.

Average scores on test of English grammar
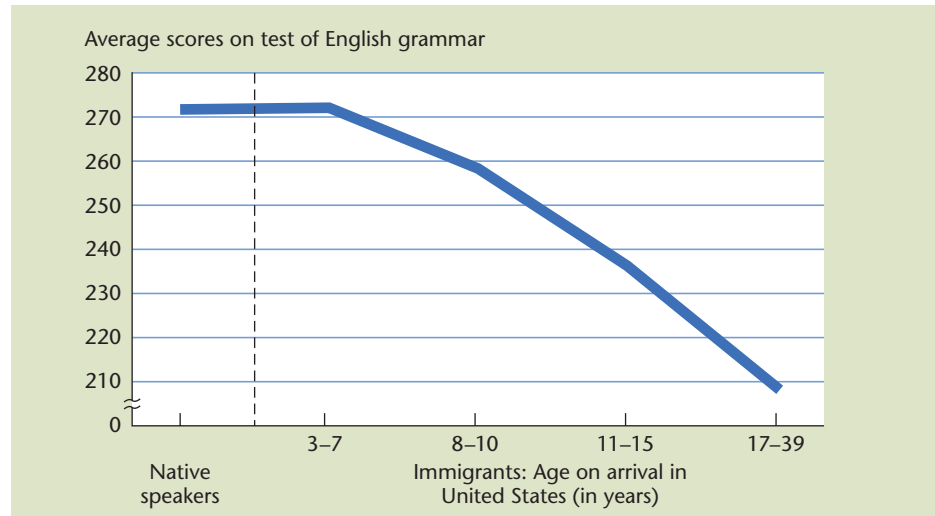
putting together two known words to create a novel meaning. Using these guidelines, there does seem to be some evidence of language in many species, ranging from the African grey parrot (Pepperberg, 2000) to dolphins (Herman & Uyeyama, 1999) and various primate species (Savage-Rumbaugh & Shanker, 1998). Some researchers, such as Kako (1999), argue that their language abilities place these animals at about the level of a 2-year-old human. They are still lacking crucial aspects of language learning such as the use of prepositions and conjunctions. Finally, the assumption that using human language effectively entails understanding the mind and its properties, whether such abilities exist in nonhuman primates, such as chimpanzees, is difficult to determine (Hermann et al., 2007; Povinelli et al., 2000).

Like the learning view, the nativist explanation of language development has its limitations. First, few theorists agree about the exact nature of the types of grammatical rules that children learn. In fact, several theorists have offered alternative explanations of the early grammar acquisition process that differ from Chomsky's original formulation (Maratsos, 1989, 1998; Pinker, 1994; Slobin, 1985). Second, language learning is a gradual process and is not completed as early as nativist accounts would predict. As we will see later in the chapter, specific aspects of grammar continue to develop in the elementary school years and even beyond.

Third, this perspective makes it very difficult to account for the many languages human beings speak throughout the world. Despite the nativist claim that languages possess universal features, it is difficult to envision features that produce such different grammatical structures and the enormous variety of sound combinations in the world's languages. Fourth, the nativist view gives the social context of language little recognition. We now know from research that takes an interactionist approach to language development that social influences play a much larger role in language development than is proposed in a nativist view (Nelson, 2007). Additionally, the theoretical assertion that language milestones are acquired in a universal stage sequence is not supported by empirical research stemming from an interactionist approach (Nelson, 1998). The communicative context of language development, especially adult-child communication, plays a significant role in the pacing of this developmental process.

It seems likely that human beings are biologically prepared *in some way* for learning language. However, it seems quite unlikely that biological principles alone can account for all aspects of language development.

The Interactionist View

Most modern theorists of language development take the interactionist view, recognizing that language is learned in the context of spoken language but assuming as well that

humans are in some way biologically prepared for learning to speak (Tomasello, 2003). The child's own active role in language development complements the role played by socializing agents like parents (Gallaway & Richards, 1994; Morgan, 1990). In addition, language acquisition is not separate from other aspects of development (Bloom & Tinker, 2001). Rather, language development occurs in a rich behavioral and developmental context in which children try to accomplish meaningful goals and engage in relationships with others. Although biology is considered an important contributor, interactionist theorists today are trying to discover just what this biological contribution is, a pursuit that Bates and Goodman (1999) refer to as determining the "nature of nurture" (p. 33).

In the interactionist view, normal language develops as a result of a delicate balance between parent and child understanding: When parents speak to children in a way that recognizes how much the children already know and understand, they increase enormously their children's chance of comprehending a novel message (Bloom, 1998; Ninio & Snow, 1996; Tomasello, 2006). You will recall from Chapter 1 that Vygotsky proposed this sort of help from older and more experienced people as necessary to children's learning. We will explore Vygotsky's concepts in greater depth in Chapter 8.

FACILITATING CHILDREN'S LANGUAGE DEVELOPMENT

An advocate of the social interaction view, Jerome Bruner has proposed that the environment provides the language-learning child with a **language acquisition support system**, or **LASS** (Bruner, 1983). This view emphasizes the parents' or primary caregivers' role as facilitators of language acquisition (Snow, 1989). When children are very young, parents support their language development with several strategies. For example, parents often introduce objects to a child to provide a basis for their mutual play and speak about objects and events that are present and easily visible to the child, as seen in the mother-child conversation that opened this chapter. They also monitor their child's apparent goals or intentions closely, often commenting on them. Although parents don't usually conceive of these practices as deliberate teaching techniques but as conversations with their children, they are facilitating their children's language learning.

We turn now to a series of techniques that adults use to facilitate language acquisition in young children. These techniques include playing nonverbal games, using simplified speech, and elaborating on and rewording children's own utterances to help them sharpen their communicative skills.

PLAYING NONVERBAL GAMES Parents make some of their first efforts to "converse" with their children in early nonlinguistic games like peekaboo or patty-cake. Children learn some structural features of spoken language, such as turn taking, from these games. And because these kinds of games involve regular, repetitive, and thus predictable behaviors, they may also lay a foundation for the rules of language. At first, young babies aren't capable of either initiating or responding in these playful "conversations." Parents help them learn these social skills

language acquisition support system (LASS) According to Bruner, a collection of strategies and tactics that environmental influences—initially, a child's parents or primary caregivers—provide the language-learning child.

Many games parents play with their young children help them learn words as well as pragmatic features of language such as turn taking and the meaning of pauses.
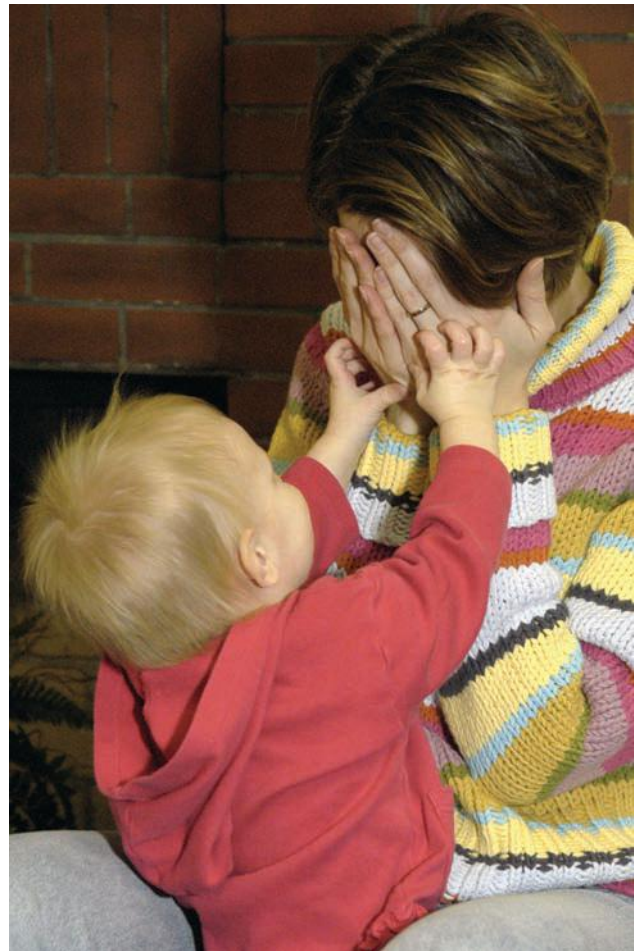
by carrying more than their share of early dialogues and by waiting for pauses in the infant's vocal or motor behavior and then inserting an appropriate response. This supportive activity of parents may contribute not only to later give-and-take in conversation but also to social turn taking in play and other more complex games (Garvey, 1990).

infant-directed, or **child-directed, speech** A simplified style of speech parents use with young children, in which sentences are short, simple, and often repetitive and the speaker enunciates especially clearly, slowly, and in a higher pitched voice, often ending with a rising intonation. Also called *motherese*.

USING SIMPLIFIED SPEECH   Parents often modify their speech when they talk to infants and children. Typically, they use a simplified style, called **infant-directed,** or **child-directed, speech** (also called *motherese*), in which they speak in short, simple sentences that refer to concrete objects and events and that often repeat important words and phrases. In this style of speech, parents also talk more slowly and in higher pitched voices, enunciate more clearly, and often end sentences with a rising intonation (Fernald, 1992; Fernald & Morikawa, 1993). The simplified grammar and syntax may help children learn the relationships between words and objects and may also give them some understanding of the rules of segmentation—that is, how speech is divided into words, phrases, and sentences. The acoustic variations can help highlight important words. For example, in reading to 14-month-olds, mothers consistently positioned a word that identified a picture ("that's a *shirt*" or "that's a *boy*") at the end of a phrase and spoke in exaggerated pitch, thus capturing their infants' attention (Fernald & Kuhl, 1987; Fernald & Mazzie, 1991).

Research has shown that newborns and 4-week-olds prefer to listen to infant-directed speech than to adult-directed talk (Cooper & Aslin, 1990) and that babies are equally responsive to this style of communication whether it is used by men or women (Pegg et al., 1992). And infants show a preference for infant-directed speech even when speech is in a nonnative language. For example, even when English-learning infants listened to Cantonese, they still appeared to prefer infant-directed speech (Werker et al., 1994).

Exaggerating speech, placing important words at the ends of sentences, and raising pitch and intonation help adults gain infants' attention, but does the use of simplified speech actually facilitate children's language learning? In fact, simplified speech may not always be helpful. In one study, children who had progressed beyond the one-word stage were more likely to respond appropriately to an adult form of a command ("Throw me the ball") than to a simplified form ("Throw ball"). As we have seen in other areas of development, a level of complexity that is slightly ahead of children may maximize their learning (Hoff-Ginsberg & Shatz, 1982; Sokolov, 1993). When infants or children show signs that they are not comprehending, adults often revert to simpler speech (Bohannon & Warren-Leubecker, 1988). In general, parents adjust their speech to a child's level of linguistic sophistication, using a wider and wider range of words and parts of speech as children mature (Hoff, 2005; Shatz, 1983).

OTHER INFLUENCE TECHNIQUES   Parents facilitate early communication in several other important ways. Consider the following exchanges between a mother and her child:

>   **Child:** Daddy juice.
>   **Adult:** Daddy drinks juice.
>   **Child:** Give Mama.
>   **Adult:** Give it to Mama.

expansion A technique adults use in speaking to young children in which they imitate and expand or add to a child's statement.

In the technique of **expansion** illustrated here, the adult imitates and expands or adds to the child's statement. Expanding on children's statements facilitates language development, including vocabulary (Weizman & Snow, 2001). And parents are especially likely to use this expansion strategy after a child has made a grammatical error (Bohannon & Stanowicz, 1988). Moreover, following up on the child's interests and attention is more supportive of learning than switching the child's attention to another topic (Dunham et al., 1993; Tomasello & Farrar, 1986). Brown (1973) has estimated that among middle-

class families, about 30% of the time parents' speech to their children is composed of such expansions but that lower-class parents use this technique much less often.

In the technique called **recast**, the adult listener reframes the child's incomplete sentence in a more complex grammatical form. For example, when the child says, "Kitty eat," the adult may recast the sentence as a question: "What is the kitty eating?" Through recasting, adults are, in effect, both correcting children's utterances and guiding them toward more appropriate grammatical usage. Some researchers have shown that children whose parents have recast their utterances appear to develop linguistically at a faster rate, using questions and complex verb forms at an earlier age than is common (Nelson, 1989; Nelson et al., 1973; Nelson et al., 1995). As we do not know how often parents use recasts, we cannot yet say how powerful a role recasting plays in normal language acquisition.

We do know, however, that children often imitate their parents' expansions and recasts, especially when the children's utterances are incorrect. When children's speech is correct, they are unlikely to imitate the adult's speech (Bohannon & Stanowicz, 1988). Perhaps children are more aware of their mistakes than we realize!

recast A technique adults use in speaking to young children in which they render a child's incomplete sentence in a more complex grammatical form.

IS SOCIAL INTERACTION CRUCIAL TO LANGUAGE DEVELOPMENT?

Some theorists hold that although social interaction is necessary to language acquisition, the specific devices of expansion and recasting, together with children's imitation, may not be necessary. First, no universal pattern of social linguistic support characterizes all parents within or across cultural groups (Hoff, 2005). In fact, there are impressive individual differences among the linguistic environments that parents within a given cultural group provide for their children (Hart & Risley, 1999; Shatz, 1983). In addition, not all cultures use the devices typical of the American middle class (Minami & McCabe, 1995; Peters, 1983). For example, among the Kaluli of New Guinea and in American Samoa, people speak to the very youngest children as if they were adults (Ochs, 1988; Schieffelin & Ochs, 1987). Evidently, there are forms of interaction that we do not yet entirely understand but that nevertheless ensure that children around the world (including the Kaluli and American Samoans) develop language at the same general pace.

The final word on the role of parental influence in language acquisition is not yet in. Those who advocate the interactionist view hold that although the child is biologically prepared for learning language, there is also strong support for the role of environmental input in the child's development of language. For instance, longitudinal research exploring the relation between maternal responsiveness and the achievement by children of language milestones indicates that a mother's responsiveness to her child's activity at 9 and 13 months of age predicts language development (Tamis-LeMonda et al., 2001). Maternal responsiveness was defined as any meaningful, positive change in the mother's behavior within 5 seconds of a child's action—for example, if the child picked up a cup and the mother said, "That's a cup." Such research suggests that social contributions play an important facilitative role in language acquisition.

THE ANTECEDENTS OF LANGUAGE DEVELOPMENT

Communication skill is not achieved solely by learning words. If we restricted our focus to verbal communication only, we could easily underestimate how early in life communication begins. To fully understand the development of human communication, we must consider the many sounds babies make as well as the many looks, movements, and gestures by which they convey meaning before they can begin to talk. These prelinguistic achievements are important precursors of actual language use (Adamson, 1995).

Preverbal Communication

Some of infants' earliest communications take place during interactions with their first caregivers (Fogel, 1993; Uzgiris, 1989). Parent and infant often engage in a kind of dialogue of sounds, movements, smiles, and other facial expressions. Smiles, in particular, seem important in helping infants learn how to coordinate vocalizations and to translate expressions into effective communication (Yale et al., 2003). Although these early transactions may seem at first glance to be "conversations," a closer look suggests that they be described as "pseudo-conversations" because the adult alone is responsible for maintaining their flow (Schaffer, 1977). Babies have limited control over the nature and timing of their responses, so adults insert their behavior into the infants' cycles of responsiveness and unresponsiveness. For instance, a baby gurgles and her mother replies by speaking to the infant. She first waits for the child's response, but if none is forthcoming, she may prompt the baby by changing her expression, speaking again, or gently touching the child. Such interactions help the infant become a communicative partner by the end of her first year (Golinkoff, 1983; Schaffer, 1977, 1996).

Gestures and expressions play an important role in this process (Goldin-Meadow, 2006). Between 3 and 12 months of age, infants improve greatly in their ability to use gestures to communicate (Fogel, 1993). By at least the time babies are 3 or 4 months old, adults offer and show things to them, and 6-month-old infants respond with smiles, gestures, movements, and sounds. When babies are about 6 months old, they begin to use a pointing gesture to guide others' attention to particular objects. Surprisingly, it's not until children are a year old that they can follow the point of another person. Through pointing, children can receive labels for objects that interest them and learn a great deal about the world around them (Golinkoff & Hirsh-Pasek, 1999). Some researchers argue that when 12-month-olds point, they are attempting to influence the thinking and action of another person and, thus, reveal an effort to share their intentions with this person (Tomasello et al., 2007).

This type of gesture also helps set the stage for learning about language and the communicative process (Goldin-Meadows, 2007). When a preverbal infant uses a gesture to

Gestures such as pointing and touching can help children connect a physical object with the word a parent or other adult is pronouncing.

call an object to someone's attention, her action is called a **protodeclarative** because it functions like a declarative statement (Bates, 1976). When babies can also use gestures to get another person to do something for them, it is called a **protoimperative**; for example, a child may point to a teddy bear on a high shelf to get someone to give it to her (Bates, 1976; Bates et al., 1989). When two communicative partners attend to the same visual information, this behavior is referred to as *joint visual attention* (Adamson & Bakeman, 1991).

As children learn language, they often combine words and gestures for more effective communication (Adamson, 1995). A child may point to an object and then comment verbally to emphasize the meaning of the words. However, children's ability to use and understand gestures may develop independently of verbal language. It's only in the third year of life that children begin to recognize that gestures and language can be part of the same message and that if they are, they require an integrated response (Bates, 1999; Shatz, 1983). Across time, children reduce their use of gestures as they rely increasingly on their verbal skills to communicate their needs and wishes (Adamson, 1995).

Early Language Comprehension

The foundations for receptive language skills emerge early. Well before they are able to speak themselves, babies can attend selectively to certain features of others' speech. In fact, newborns prefer listening to speech or to vocal music than to instrumental music or other rhythmic sounds (Butterfield & Siperstein, 1972). As we saw in Chapter 4, infants quickly become skilled listeners. Even a 2-day-old infant can distinguish his mother's voice from the voice of an unfamiliar woman. Moreover, like adults, infants respond with different parts of their brains to speech and nonspeech sounds. Electrical activity, for example, increases in the left half of the infant's brain in response to speech, whereas the right side responds to music (Molfese, 1973; Molfese & Betz, 1988; Neville, 1991).

CATEGORICAL SPEECH PERCEPTION   The finding that infants perceive some consonants categorically is one of the most remarkable psychological discoveries of recent decades (Aslin et al., 1998; Werker & Polka, 1993). Infants hear "one range of acoustic signals all as /p/ and a different range of acoustic signals as /b/ but no acoustic signal is perceived as something in between a /p/ and a /b/" (Hoff, 2005, p. 109). This phenomenon is known as **categorical speech perception**, or the *phoneme boundary effect*. In a classic study of discriminatory ability, one group of 5-month-old babies listened to 60 repetitions of the sound *bah*, followed by 10 repetitions of *gah*; a second group listened to 60 repetitions of *gah,* followed by 10 *bah* repetitions; and a third group heard only 70 repetitions of *bah* (Moffitt, 1971). The babies in the first two groups showed a marked heart-rate response when the experimenters suddenly presented the new consonant sound, *gah* or *bah*, respectively, which is evidence that the infants perceived the change. Babies in the third group showed no change in heart rate, suggesting that this sort of change as seen in the babies of the first two groups was not simply a reaction to the continuation of sounds. This ability to discriminate speech sounds is evident from as early as 1 month of age and holds true for a variety of other consonants, such as *m, n*, and *d* (Aslin, 1987; Aslin et al., 1998; Miller & Eimas, 1994). Infants' discrimination abilities rapidly improve; by the time they are 2 months old, infants can tell the difference between /a/ and /i/. Even more remarkable, 2- to 3-month-old infants can recognize the same vowel even when it is spoken by different people at different pitches (Marean et al., 1992).

Findings such as these seem to suggest that infants are indeed born with some innate mechanism for perceiving oral language. However, although evidence suggests that infants have an innate tendency to find the boundaries in sound patterns, as we saw in Chapter 4, the tendency to organize and group incoming information into patterns

protodeclarative A gesture that an infant uses to make some sort of statement about an object.

protoimperative A gesture that either an infant or a young child may use to get someone to do something she or he wants.

categorical speech perception The tendency to perceive as the same a range of sounds belonging to the same phonemic group.

is not unique to processing the sounds of speech. In addition, research by Miller and colleagues (1976) revealed that chinchillas show categorical speech perception and can discriminate between /b/ and /p/! This research casts further doubt on the notion that humans are uniquely prepared for language acquisition. Instead of being a specifically linguistic property of auditory perception, categorical speech perception may be a property of the mammal's aural system that language simply utilizes (Kuhl et al., 1997; Miller & Eimas, 1994).

BEYOND CATEGORICAL PERCEPTION   Categorical speech perception is not the only skill babies exhibit that may help them learn language. In Chapter 4, we discussed a study by DeCasper suggesting that infants may learn some features of language prenatally; recent evidence suggests that infants can identify key properties of their native language's rhythmic organization either prenatally or during the first few days of life (Saffran et al., 2006). For example, 4-day-old French babies increased their sucking rate when listening to French speech as opposed to Russian (Mehler et al., 1988).

Whatever innate abilities infants have for perceiving speech sounds, these abilities constantly interact with experience over the language-learning period. Research suggests that as babies develop, they lose their ability to distinguish the sounds of languages to which they haven't been exposed (Werker, 1989). For example, one study found that infants of English-speaking parents could distinguish between sounds that are unique to Swedish only until the age of 6 months (Kuhl et al., 1992). Similar findings occur for other languages as well. Jusczyk and colleagues (1993) found that by the time American infants were 9 months old, they "tuned out" Dutch words, and Dutch infants were similarly unresponsive to English words. Findings such as this underscore the likely dual role of innate and experiential factors in the early recognition of speech sounds.

Although babies become highly skilled at discriminating the speech sounds of their native language at an early age, it takes time for them to learn to focus on important sound distinctions in everyday speech. As we've seen, 1-month-old infants can detect the differences between the consonant sounds of *bah* and *gah*, and 2- and 3-month-old infants are able to recognize the consistency of a speech sound, for example /i/, even when pronounced by different speakers (Marean et al., 1992). Learning a language also requires learning which of the many discriminable differences in speech sounds actually signal differences in meanings. Recent evidence suggests that infants can segment fluent speech and recognize words in ongoing speech better and much earlier than we had thought possible—by the end of their first year (Saffran et al., 2006) and perhaps even as early as 6.5 to 7 months of age (Thiessen & Saffran, 2003). Research suggests that infants have the capacity to make the kinds of distinctions that indicate word boundaries in the flow of speech (Hohne & Jusczyk, 1994; Morgan & Saffran, 1995; Saffran et al., 1996) and they use a variety of cues such as strong syllables (e.g., *tar* in gui•TAR), stressed monosyllables (e.g., *cup, dog,* or *bike*), a strong syllable followed by a weak one (e.g., FOWL•*er*, TUR•*ban*), and rhythmic properties to help define the boundaries of words, including pitch and pauses (Jusczyk et al., 1993; Jusczyk et al., 1999; Morgan, 1994; Thiessen & Saffran, 2003).

According to other research (Saffran et al., 1996), 8-month-old infants can detect new words in unfamiliar artificial language even when they have no idea what the words mean. Researchers had infants listen to 2 minutes of nonsense syllables mixed with "words" from an artificial language, which the researchers devised to eliminate the possibility that the infants were picking out words based on what they had already learned at home. Using a habituation paradigm, the researchers noted that when the tape was played a second time, the babies did not pay attention to the words—an indication that they had already learned them. This suggests that in the second half of the first year, babies are capable of detecting words in ongoing speech (Aslin et al., 1996). Fortunately, infants have the ability to detect words in sentences because this is how

most words are introduced to the young language learner. When researchers Woodward and Aslin (1990) asked mothers to teach new words to their 12-month-olds, the mothers presented their infants with most of the words in sentences. They presented only 20% of the words as words alone.

Babbling and Other Early Sounds

It is not just receptive language abilities that develop rapidly in infancy. Babies are actively producing sounds—even though not language—from birth onward. Anyone who has been awakened in the wee hours of the morning by the sound of a baby happily "talking" to herself knows that infants are neither quiet nor passive in the process of early language learning. They make a great many sounds, as if "gearing up" for their ultimate production of speech.

The production of sounds in the first year of life follows an orderly four-stage sequence summarized in Table 7-2. Crying, which begins at birth, is an important way of indicating distress and serves as a rudimentary means of communication. **Cooing**, the production of vowellike sounds, starts at the end of the first month. Cooing, so named because it consists of *oo* sounds that resemble the sounds pigeons make, often occurs during social exchanges between infant and caregiver. **Babbling**, or producing strings of consonant-vowel combinations, begins in the middle of the first year. Finally, at the close of the first year, **patterned speech** appears. In this pseudospeech, the child utters strings of "words" made up of phonemes in his native language that sound very much like real speech—even in intonation—but are not. These various stages overlap, and even patterned speech and true speech may occur together as the child's first meaningful words begin to appear.

Not only does the early production of sounds follow an orderly sequence, but the kinds of sounds made at each of the first three stages are quite similar across different language communities. For instance, young Chinese, American, and Ethiopian babies all babble similar consonant-vowel combinations, even though they are exposed to different phonemes in their native languages (Thevenin et al., 1985). Even the early babbling of deaf babies sounds similar to the babbling of babies who can hear (Lenneberg et al., 1965). Deaf infants born to deaf parents who sign (rather than speak) babble with their hands and fingers at the same age as hearing children babble vocally; moreover, their movements show similar structure in terms of syllabic and phonetic patterning (Bloom, 1998; Petitto et al., 2001). These similarities between manual and vocal babbling suggest "a unitary language capacity that underlies human signed and spoken language acquisition" (Petitto & Marenette, 1991, p. 1495). Overall, these findings suggest that the pattern of development of early sounds that infants make is a function of maturational changes in vocal structures and in the parts of the brain that control producing sound.

In the middle of the second half year, however, cultural differences in the prespeech sounds that babies make begin to emerge. For instance, babies exposed to one of two different native languages, Arabic or French, which contrast significantly in voice quality and pitch, may begin to show differences in their babbling at around 8 months of age

cooing A very young infant's production of vowellike sounds.

babbling An infant's production of strings of consonant-vowel combinations.

patterned speech A form of pseudospeech in which the child utters strings of phonemes that sound very much like real speech but are not.

Stage	Begins	Description
Crying	At birth	Signals of distress
Cooing	At about 1 month	*Oo* sounds that occur during social exchanges with caregiver
Babbling	Middle of first year	Strings of consonant-vowel combinations
Patterned speech	Close of first year	Strings of pseudowords, made up of phonemes in native language, that sound like words

Table 7-2

Stages of sound production in the infant's first year

(Ingram, 1989). Japanese and French words contain more nasal sounds than Swedish and English words, and in the latter part of the first year, French and Japanese babies' babbling contains more nasal sounds than that of their Swedish and English counterparts (De Boysson-Bardies et al., 1992). It is as if the babies are now starting to "tune in" to the language they hear spoken around them. Interestingly, the amount of time exposed to language, not just the baby's physical maturation, appears to be an important factor. Babies who are born prematurely, and who are therefore exposed to language earlier (in terms of their gestational age) than full-term babies are, begin complex babbling sooner than full-term infants (Eilers et al., 1993).

Thus, although historically linguists have argued that there is no relation between babies' early vocalizations and their later speech (Jakobson, 1968), more recent evidence challenges this view. The babblings of infants over their first year resemble the child's first meaningful words in a variety of ways (Carroll et al., 2003; Elbers & Ton, 1985; Oller et al., 1976). As one language expert has noted, "Late babbling contains sounds very much like those that are used in early attempts to pronounce words. . . . Babbling is indeed relevant to the child's developing linguistic skills" (Sachs, 1985, p. 49). Evidently, a child's early vocalizations are not only orderly in their development but also related to later speech. In terms of the foundations for both receptive and productive language skills, the human infant is very well prepared for learning to talk.

SEMANTIC DEVELOPMENT: THE POWER OF WORDS

naming explosion The rapid increase in vocabulary that the child typically shows at about the age of 1.5 years.

Despite children's early skills in both receptive and productive language, research suggests that children's understanding of language far exceeds their capacity to express themselves clearly (see Figure 7-2). These findings may help to explain the fact that children don't develop their vocabularies in a strictly linear fashion. Like other aspects of development, vocabulary acquisition proceeds in bursts. The **naming explosion** (Bloom et al., 1985) is the rapid increase in vocabulary that most children begin to show at the age of about 1.5, when typically they can comprehend between 50 and 100 words. Children usually utter their first words between 10 and 15 months (Fenson et al., 1994). In one well-documented case, a 16-month-old learned 44 words in a single week!

By the age of 2, the average child knows approximately 900 root words, and by 6, when he is in either kindergarten or first grade, he knows 8,000! Whether this increase occurs in spurts or more gradually is under study (Bloom, 2000). Some recent research

Figure 7-2

Receptive and productive language in infants

Children's comprehension outpaces their production of words. On average, children understood nearly 100 words by the time they were 18 months old but could produce only 8 to 10.

Source: Huttenlocher, 1974.

Cumulative number of words

Comprehension

Production

Age (months)
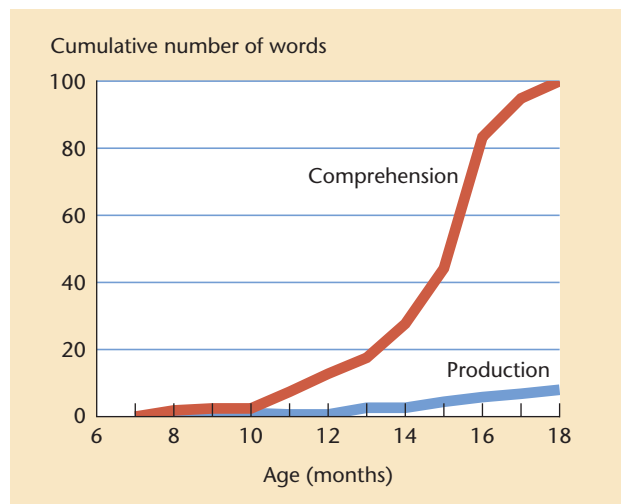
suggests that although some children—about 20%—display a true spurt or explosion in vocabulary, most children add words gradually (Ganger & Brent, 2004). Whatever the answer here, clearly, the remarkable growth of vocabulary over the first 5 years of life is a dramatic example of the human capacity for language and communication.

How do children learn words? Imagine that you have taken a job in a foreign country, and your first task is to learn the language. A native of the country points to a dog lying on a rug and says, *"Xitf."* How do you know whether *xitf* refers to the dog, the dog's twitching ear, the dog's name, the dog's fur, the fact that the dog is sleeping on the rug, the fact that the dog is the speaker's pet, or indeed, the rug itself? Clearly, the acquisition of object names is no simple matter. Let's look a bit more closely at this issue.

How Children Acquire Words

There are many different views of how children create a linguistic link between the mind and the world (Waxman & Lidz, 2006). Some theorists argue that children simply form an association, others contend that the social aspect of this process is important, and still others take the middle ground. According to Smith (2000), word learning is based on associations combined with attention to perceptual similarity. Through experience, children realize that words label categories based primarily on similarity of overall object shape. If a child sees many tables that are often given the label *table*, over time he will realize that most things with a flat top and four legs get the label of *table*.

Another view is that children use mainly social cues from adults to learn what a word labels (Bloom, 2000; Tomasello, 1998). Many findings show that simply hearing a label in the presence of an object is not enough for an infant to learn that the word is a symbol for the object. For example, seeing a novel toy on a table and hearing an automated voice saying *glorp* will not cause the child to attach the label *glorp* to the object. Children depend on social cues such as pointing and the speaker's eye gaze.

Still other theorists claim multiple cues are available to infants for word learning, but how much they depend on each type of cue changes with age (Hollich et al., 2000). In this viewpoint, younger children do rely on perceptual similarity to realize when a word is the correct label for an object, but as they get older, they become more dependent on social and linguistic cues. There is evidence that 16-month-olds will not accept a common label for two objects that look extremely different, but 20-month-old infants are willing to trust the speaker and give two perceptually distinct objects the same label (Nazzi & Gopnik, 2001).

Although the task of word learning may seem difficult, infants appear to come into the task with some constraints or principles that aid them. (See Box 7-2 for a discussion of how children with mental retardation can learn to use words.) Markman (1989) was the first to introduce the idea of word-learning principles. For example, the *whole object constraint* involves the assumption that a new word refers to the entire object and not to one of its parts or properties. Children as young as 18 months appear to make use of this constraint. For example, when 2-year-old Jamal visits the zoo and hears the word *anteater* for the first time, he assumes that anteater refers to the animal, not its nose, body, or behavior. Even 12-month-olds associate novel words with whole objects rather than parts of the object (Hollich et al., 2007).

After Markman introduced the concept of constraints, researchers began to notice other constraints that children seem to follow in word learning (Markman & Hutchinson, 1994; Merriman & Bowman, 1989). As a result, Hollich and colleagues (2000) have compiled a set of six principles "deemed necessary and sufficient to account for how children get word learning "off the ground" within the framework of their Emergentist Coalition Model (ECM). These principles are less strict than the more nativist view Markman proposed because the principles themselves undergo change with development and because the use of these principles depends on a combination of both inborn biases and word-learning experience.

BOX 7-2

Risk and Resilience

CHILDREN AT RISK FOR FAILURE TO DEVELOP LANGUAGE

Youth with moderate or severe mental retardation often need extensive and ongoing support in more than one major life activity; one of the most important is communication. Youth with moderate and severe retardation range from those who do learn to speak, although slowly and often with limited success, to those who are unable to develop spoken communicative skills at all, even with considerable speech and language instruction.

Using one of the methods developed by investigators of nonhuman primate communication, Mary Ann Romski and Rose Sevcik (1996) have shown that such youth who have never developed oral speech can learn to communicate intelligibly with adults and peers. In an approach based on Vygotskian concepts, each of 13 young boys with moderate to severe retardation worked with a partner (a teacher or a parent) who demonstrated and encouraged the child in using a computerized device that enabled him to select a particular symbol or lexigram, referred to as the System for Augmenting Language (SAL), on a keyboard to produce a single word or phrase (Figure 7-3). When the child presses a given key, the computer produces a synthesized voicing of the word or phrase and also prints it on a screen. The literature on children with severe retardation had claimed that such children could learn only with continuous prompting. Romski and Sevcik found, however, that a majority of their participants, 12 years old on average, who used the SAL device rapidly learned to associate symbols with words and phrases. By the end of the 2 years, most of the participants could both comprehend and produce a majority of the vocabulary words presented to them in instruction sessions. More than half of the participants even demonstrated the skill of fast-mapping, immediately associating a new name with a new object/symbol.

Romski and Sevcik chose to use arbitrary visual-graphic symbols rather than representational pictures in this work in part because they wanted to study "the process of learning to communicate symbolically"

(1996, p. 61). They introduced only a small number of symbols at a time to participants, beginning with a set of 12 symbols relevant to mealtime—symbols for specific foods, drinks, and utensils. The next group of words introduced related to leisure time activities—for example, *ball, game, magazine, television*—and the third group were social-regulative words and phrases such as *hello, excuse me, I want*, and *thank you*. A final group consisted of words tailored to individual participants' needs; for example, they added the word *work* to the lexicon of a participant who had a part-time job.

By the end of the 2-year period, all participants had acquired 53 single words or two-word phrases in the first two categories, 16 words or phrases in the third group, and additional words or phrases in the final category. Moreover, many used their lexicons to engage in communication with people in the community without the use of the computer and synthesized speech. Thus, the participants' speech production had to stand on its own. For instance, one youth, classified as severely retarded, went to a mall music store and requested the assistance of a clerk by asking "HELP TAPE" and then showing the clerk a photograph of the tape he wanted. With tape in hand, the youth then said "THANK YOU" (Romski & Sevcik, 1996, p. 145).

According to Romski and Sevcik, some parents have been reluctant to offer SAL training to their children because they fear it will impede the children's efforts to learn to speak. Very few data, in fact, are available on the outcome of the early use of intervention with speech-output communication devices. Clearly, there is room for a great deal more research in this area. Among other things, we need to know what early predictors, such as specific behaviors or difficulties, may differentiate children who will not develop speech from those who will. We also need to determine whether early intervention with SAL could not only help children who are at risk for failure to develop language to communicate but perhaps also help provide the cognitive stimulation and trigger the motivation that might facilitate their learning of oral speech. What-

These six principles begin with the basic necessity to understand language. For example, the first thing a child must understand is the principle of *reference*, or the idea that words stand for objects, actions, and events. Later in development, children come to understand more complex principles such as the *Novel Name-Nameless Category* (abbreviated as *N3C*). Similar to Markman's (1994) *mutual exclusivity bias*, N3C
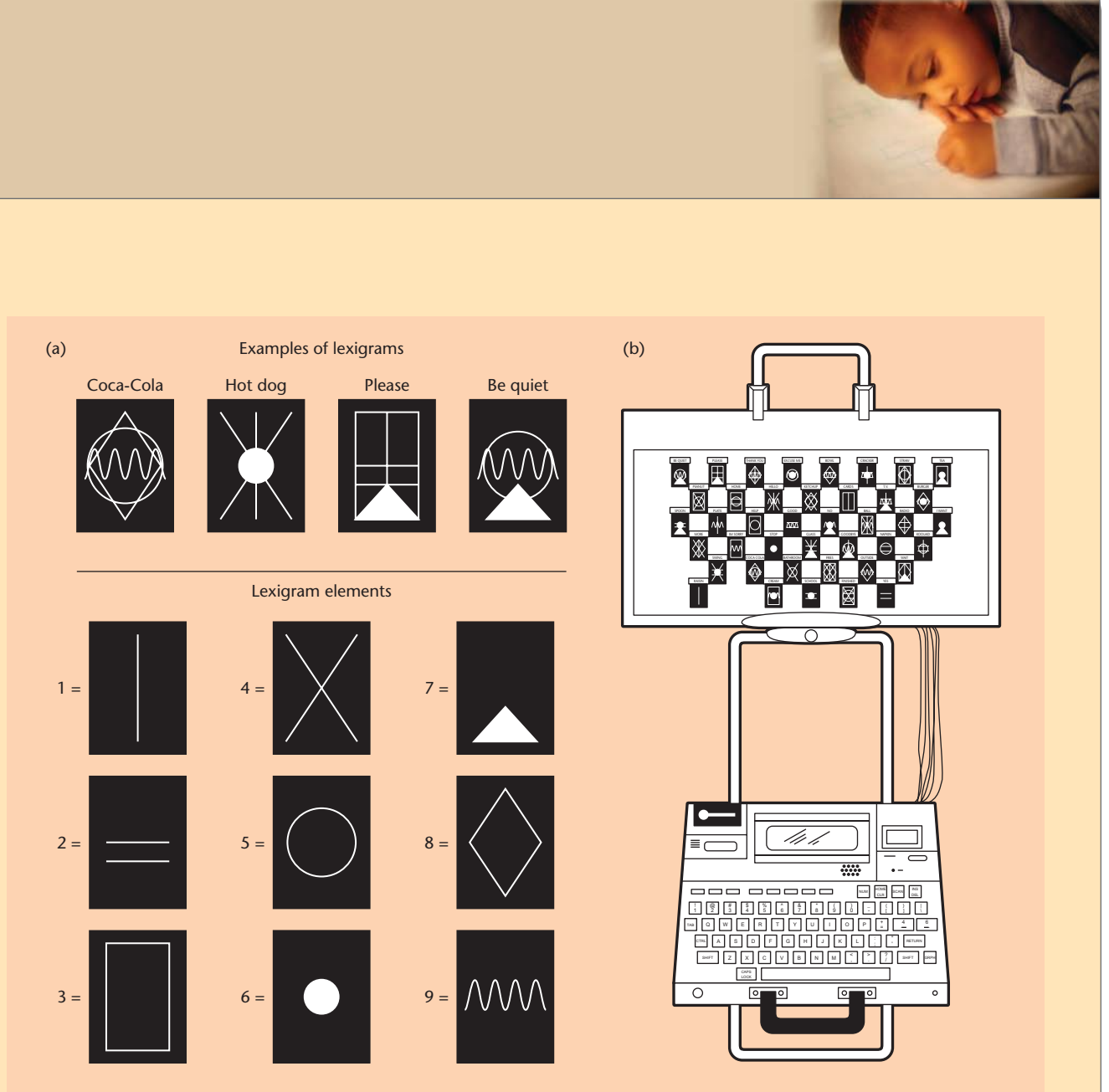
Figure 7-3   Communicating with a computer and lexigrams

(a) Lexigrams like these, each made up of some combination of the nine elements shown, appear on the upper keypad of the computerized device (b). When a child presses the key for, say, *hot dog*, the words are sounded in synthetic speech and are also printed on the display screen of the computer.

ever its ultimate usefulness, SAL training has revealed the presence of cognitive capacities in children with mental retardation who, by traditional measures, had been considered only minimally functional. The work suggests that such young people can learn language under the right conditions and can apply it in social interaction.

states that upon hearing a novel label, infants assume it labels a novel object over a familiar one. In a representative experiment, the researcher placed four objects in front of a 28-month-old (Golinkoff et al., 1992). Three of the objects were familiar (a ball, a shoe, and keys) and one was unfamiliar (a tea strainer). The experimenter asked for the *glorp*. Consistent with N3C, children in this experiment selected the unnamed object

as the referent for *glorp*. In a control condition in which no label was used, but children were asked to retrieve an object, children selected the unnamed object only at a chance level.

The ECM places a strong emphasis on the necessity for social interaction in word learning. According to Nelson (1998), to acquire a full understanding of semantic development, we must look more closely at the social context in which word learning occurs. Some researchers have found, for example, that parents clearly influence vocabulary growth. In one example, the amount of time parents spent reading to their 2-year-olds was significantly related to the children's language skills when they were 4 years old (Crain-Thoreson & Dale, 1992). Another study found that the more parents talked to their children, the larger the children's vocabularies became (Huttenlocher et al., 1991).

Some of the strongest support for the social environmental approach comes from studies of vocabulary development in children of differing socioeconomic classes and in relation to parental education (Huttenlocher et al., 2007). Hart and Risley (1999) studied the language environments of 42 children, ranging in age from 10 months to 3 years, by observing them in their homes. These investigators found that social class, language environment, and children's vocabulary were all highly correlated: The higher the social class, the richer the language environment, and the greater the growth in the child's vocabulary (see Figure 7-4). A large study conducted by Weizman and Snow (2001) extended these results by investigating the home language environments of children in low-income families at age 5 and the vocabulary performance of these same children in kindergarten and second grade. Two important findings emerged. First, the researchers found substantial variation in these children's homes in language experience; not all low-income mothers communicate with their children in the same way. Some mothers produced a much richer language experience for children than others did. Second, children's language experience at home at age 5 was positively related to their later vocabulary performance in school.

Whether language is supported at home or outside the home, social stimulation is important to its development. Three-year-old children who attend day-care centers with stimulating language environments, in which there is much conversation between children and their caregivers, have more words for letters, colors, and shapes—the kinds of words that help prepare them for school—than children who attend programs with fewer conversational opportunities (NICHD Early Child Care Research Network, 2000).

What Kinds of Words Do Children Learn First?

Analyzing the kinds of words children acquire, and the ways in which they use them, can give us important information about children's cognitive development and concept formation. Studying the first 50 words learned by a group of 18 young children, Nelson (1973), in a classic study of early word acquisition, classified these words into six categories. Mothers kept diaries of each new word their children produced until the children produced 50 words. On average, children reached the 50-word level by the time they were 1.5, but there was a great deal of individual difference. Some infants learned their first 50 words by 15 months, whereas others took 24 months. As Figure 7-5 illustrates, about 65% of the 50 words were naming or object words, whereas words denoting action made up only about 14%. Schwartz and Leonard (1984) found about the same proportion of action words, and other research has determined that nouns are learned more easily than verbs (Childers & Tomasello, 2002).

One explanation for why children may learn object words first is that the concepts to which object words refer are simpler than those to which action words refer (Gentner, 1982; Huttenlocher & Smiley, 1987). To learn object words, children must match objects with their appropriate linguistic referents (Gentner, 1982), but to learn action words, or verbs, children must also form an understanding of the connections between objects
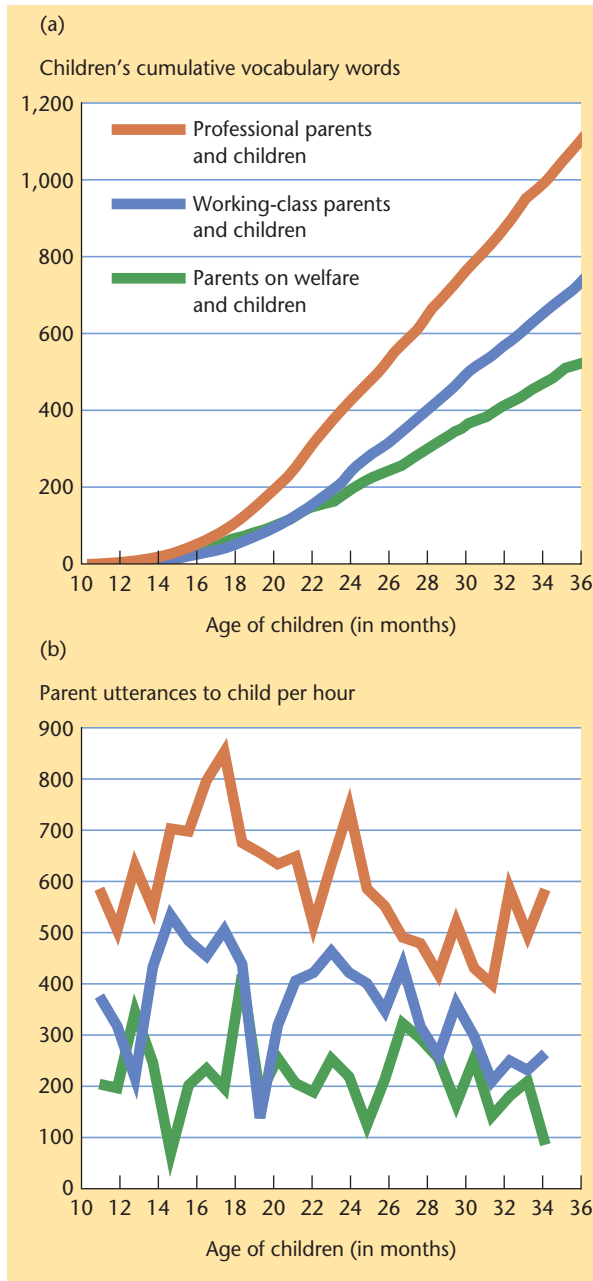
Figure 7-4

Social class and vocabulary development

(a)

Children's cumulative vocabulary words

Professional parents and children

Working-class parents and children

Parents on welfare and children

Age of children (in months)

(b)

Parent utterances to child per hour

Age of children (in months)

Note: Key in (a) applies also to (b). (a) Over a period of a little more than 2 years, children from working-class families (middle to lower socioeconomic status) built vocabularies about two thirds as large as those acquired by children from professional families; children from families who were on welfare acquired vocabularies only half as large as those of the children from higher class families. (b) The frequencies with which parents in each of the three groups talked to their children correlated quite well with children's vocabulary size. Parents in professional families, whose children had the largest vocabularies, talked to their children the most. Parents in working-class families, whose children had the next largest vocabularies, talked less often. And parents in welfare families, whose children had the smallest vocabularies, talked even less.

Source: Hart & Risley, 1995.

and actions (Huttenlocher & Lui, 1979). However, some action words are learned more readily than others. Huttenlocher, Smiley, and Charney (1987) found that children are better at learning action words for things they can actually do themselves. For example, a 2-year-old is more likely to learn the word *walk* than *skip* because she is physically able to perform the action of walking.

Some researchers (e.g., Bloom, 1993, 1998) have challenged the assumption that object names predominate in early vocabularies. Studying children who ranged in age from 9 months to 2 years, Bloom found that object words represented only a third of the words the children learned. Similarly, Tardif (1996) found that 21-month-old children learning Mandarin Chinese used equal numbers of verbs and nouns in their speech. In part, this is because in some Asian languages verbs play a more prominent role in speech and often occur in a prominent place at the end of a sentence (Hoff, 2005). The

Figure 7-5

Words that children use first

According to the classic work illustrated here, naming or object words make up almost two thirds of the vocabularies of children between 1 and 2 years old.

Source: Based on data from Nelson, 1973.

Percentage

| General nominals (*ball, dog*) | Specific nominals (*mommy*) | Action words (*give, bye-bye*) | Modifiers (*red, dirty*) | Personal social words (*yes, no, please*) | Function words (*what, for*) |
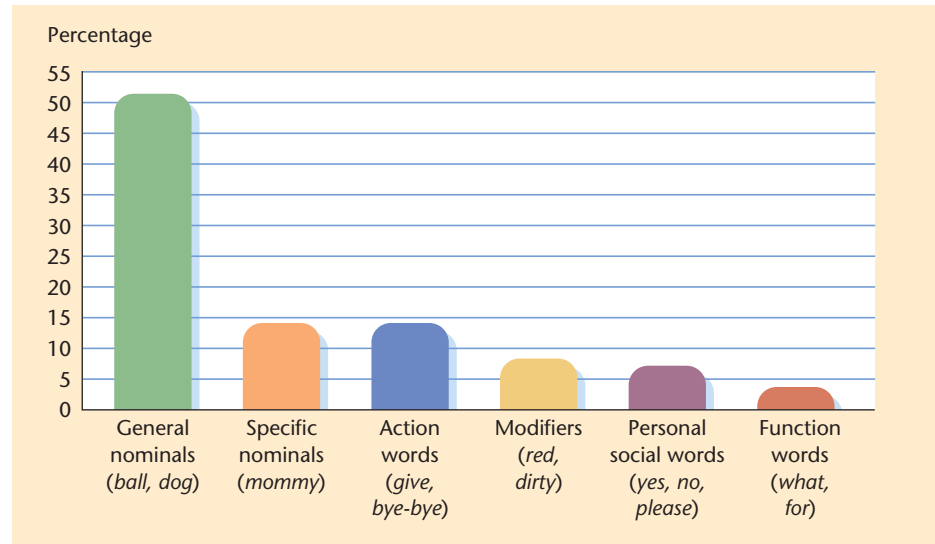
fact that Japanese mothers spend less time labeling objects than American mothers may also account for the less pronounced bias toward noun production among Japanese children (Fernald & Morikawa, 1993).

It is important to note that the principles and constraints discussed in object learning must also apply to verb learning. With this in mind, Merriman and associates (1996) investigated children's use of the *mutual exclusivity* bias in verb learning. Two-year-olds watched a TV screen that on one side had an actor doing an action that the children had a word for, like clapping, while on the other side a different actor did something that the children had no word for, like rolling his arms in circles. Overall, both actions were equally interesting to the infants, but when the children were asked to "Look at the person glorping," they were more likely to look at the novel action. This is similar to Golinkoff and colleagues' (1992) finding in which children assumed a novel label applied to a novel object.

Errors in Early Word Use

overextension The use, by a young child, of a single word to cover many different things.

Errors in children's early word use can help illuminate the learning process. Two such errors are overextension and underextension. In **overextension**, children use a single word to refer to many different things. For example, a young child may use the word *doggie* for horses, cows, giraffes, and all sorts of four-legged animals. (See Table 7-3 for examples of children's overextensions.)

Rescorla (1980) investigated how and when children between 1 year and 18 months overextend words. She found that although about a third of young children's utterances involve overextensions, a relatively small number of different words are included. Rescorla also found that children's overextensions usually show one of three themes or characteristics. First, overextensions can be categorical, meaning children will use one word within a category for another closely related word; for example, they will use the name of one color for another. Second, the words are used for something perceptually similar, as when a child calls all round objects *balls*. Finally, overextensions can reflect a relationship. For example, a child might use the word *doll* for an empty crib where the doll should be. As children's vocabularies increase, they use fewer overextended words (Bloom, 1993; deVilliers & deVilliers, 1992).

underextension The use, by a young child, of a single word in a restricted and individualistic way.

In **underextension**, a less common type of error, children use a single word in a highly restricted and individualistic way. For example, a child may use the word *car* only when she sees her father's yellow Chevy and may call all other automobiles, including her mother's green Ford, *trucks* (Bloom, 1993, 1998). The use of underextensions

Word	Referents
Ball	Ball, balloon, marble, apple, egg, wool pom-pom, spherical water tank
Cat	Cat, cat's usual location on top of TV even when absent
Moon	Moon, half-moon-shaped lemon slice, circular chrome dial on dishwasher, ball of spinach, wall hanging with pink and purple circles, half a Cheerio
Snow	Snow, white tail of a spring horse, white flannel bed pad, white puddle of milk on floor
Baby	Own reflection in mirror, framed photograph of self, framed photographs of others

Table 7-3

Some examples of children's overextensions

Source: From *Language Development*, 3rd edition by Hoff. © 2005. Reprinted with permission of Wadsworth, a division of Thomson Learning: www .thomsonrights.com. Fax 800-730-2215.

suggests that a child's understanding of a word is too restrictive or limited to a small set of meanings. In speaking with their young children, parents may not initially give every instance of a class of objects its correct name and may thus trigger some word errors. Mervis and Mervis (1982) found that mothers tended to use single nouns to label certain toys and objects; for example, they called both lions and leopards *kitty cats*.

According to some researchers, errors like over- and underextension in early word use are not really errors in the usual sense of the term. As a child's vocabulary is limited, she may try to find a linguistic form that fits with an element of experience (Bloom, 1993, 1998). As Bloom notes,

It seems entirely reasonable for the child to use an available word to represent different but related objects—it is almost as if the child were reasoning, "I know about dogs; that thing is not a dog. I don't know what to call it, but it is like a dog." (1976, p. 23)

Gradually, as the child's vocabulary improves and her conceptual categories become stabler, her accuracy in word use increases.

THE ACQUISITION OF GRAMMAR: FROM WORDS TO SENTENCES

In their early years, children learn an incredible amount about language, and the rapidity with which children learn the complexities of language continues to fascinate developmentalists. As Table 7-4 shows, in a period of just 10 months, a child may go from barely intelligible speech to clear communication.

In this section, we examine this leap in the clarity and sophistication of communication. You may find it helpful to refer to the Turning Points chart on pages 254–255 to keep track of the sequence of development encompassed. We begin with the child's use

Child at 28 Months
"What dat?"
"Where birdie go?"
"Have screw . . ."
"Get broom . . ."
Child at 38 Months
"Who put dust on my hair?"
"You got some beads?"
"I broke my racing car."
"It's got a flat tire . . . when it's got flat tire it's need to go . . . to the station."

Table 7-4

Speech samples 10 months apart

Sources: Adapted from Brown & Bellugi, 1964; McNeill, 1970.

Turning Points

BIRTH   Cries

Perceives others' speech

Prefers human voices

1–6 MONTHS   Decreases crying

Makes soft sounds

Coos, laughs, gurgles

Imitates short string of vowel sounds; alternates making sounds with another person

Makes consonant sounds; "says" consonants increasingly often

Responds to prosodic features of speech (e.g., inflection and pitch)

Intonations move toward speech patterns heard most often

Recognizes own name

6–12 MONTHS   Babbles strings of consonant-vowel combinations

May babble more in familiar than unfamiliar settings

Sounds resemble speech

Shows increasing preference for own language over unfamiliar language

Produces sound for familiar toy or object; experiments with sounds

Babbling develops a sentencelike quality

May "say" a word—bah for "bottle," mah for "mother"

May say no but doesn't always mean no

May say two or three words; uses same word for category, such as wah for both "water" and "milk"

Intentional communication begins

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental changes.

Sources: Hoff, 2005; Kopp, 1994; Tomasello, 2006; Waxman & Lidz, 2006.

of single-word utterances and then consider the evolution of two-word sentences, the emergence of modifications such as plurals and possessives, the development of questions and of negating sentences, and the beginning of learning how to understand the meanings of others' utterances.

Can One Word Express a Complete Thought?

Are first words simply words? Or are they early attempts to express complete thoughts? When a young child points to a toy airplane on a high shelf and says "Down," or when

12–18 MONTHS	Forms one-word sentences at first
	Tries hard to make self understood
	Makes symbolic gestures
	Imitates words; may repeatedly use a new word
	May use a few two-word sentences
	May use adjective to refer to self (good boy)
	Understands naming processes
18–24 MONTHS	Begins naming explosion; average child goes from 50 to 900 words in about 6 months
	Uses two-word sentences
	Rapidly expands understanding
24–36 MONTHS	Decreases gesturing
	Gives up babbling
	Increases use of plurals, past tense, definite and indefinite articles, some prepositions
	Uses three-word combinations
	Shows excellent comprehension
	Gradually increases use of sentences to communicate
36–48 MONTHS	Uses yes/no questions, why questions, negatives, and imperatives
	Embeds one sentence within another (using clauses)
	Uses overregularizations
	Vocabulary increases by about 1,000 words
	Coordinates simple sentences and uses prepositions
48–60 MONTHS	Uses pragmatic rules of communication in increasingly sophisticated way
	Uses humor and metaphor
5 YEARS AND BEYOND	Uses more complex syntax
	Further expands vocabulary (to about 14,000 words)
	Develops metalinguistic awareness

he takes a spoon from his mother and says "Me," is there more to his utterance than meets the ear? In the first case, parents may assume that the child is requesting that the toy be taken down off the shelf; in the second example, they might guess that the child is saying, "I want to do it myself."

Dale (1976) has noted, "First words seem to be more than single words. They appear to be attempts to express complex ideas—ideas that would be expressed in sentences by an adult" (p. 13). The term **holophrase** has been given to such single words that appear to represent a complete thought. Whether or not children are really expressing in these single-word utterances thoughts that could be expressed in sentences—thoughts that include subjects, objects, and actions—remains an unanswered question.

holophrase A single word that appears to represent a complete thought.

Two-Word Sentences

telegraphic speech Two-word utterances that include only the words essential to convey the speaker's intent.

Sometime between 1.5 and 2 years of age, the child begins to put two words together in what is often called **telegraphic speech**. Like telegrams, these two-word utterances include only the crucial words needed to convey the speaker's intent. Although children generally use nouns, verbs, and adjectives, they are likely to omit other parts of speech such as articles and prepositions. Thus, the child's speech is creative and is not merely a copy of adult language. Table 7-5 shows some two-word sentences used by young children speaking either English or one of several other languages (Slobin, 1985). Notice how these two-word phrases resemble one another in terms of the relationships between the words, or the basic structure or grammar of language, no matter how different the languages in which they were spoken. This similarity in relations extends to the sign language many deaf people use. As Box 7-3 shows, in acquiring American Sign Language (ASL), deaf children start out with many of the same word combinations that hearing children produce as they acquire oral language.

Why are the early utterances of children similar in terms of the meaning of what they talk about? Language can be viewed as a way of expressing what one knows or understands about the world. As children's capacity for understanding events in the world around them continues to grow, and because children around the world tend to have encounters with similar kinds of basic situations in life, their learning of language is tied to their cognitive development. Such fundamental experiences include the distinction between self and other, the concept of causality, and an understanding of objects. Thus, wherever they live, in whatever society, children beginning to speak express similar relationships and events, such as agent-action relations, possessives, and person and object identity. The development of cognitive capacity and the development of language are closely related (Carey, 1994; Clark, 1983).

Table 7-5   Two-word sentences in several languages

Function of Utterance	LANGUAGE					
	English	**German**	**Russian**	**Finnish**	**Luo**	**Samoan**
Locate, name	*there book*	*buch der* [book there]	*Tosya tam* [Tosya there]	*tuossa Rina* [there Rina]	*en saa* [it clock]	*Keith lea* [Keith there]
Demand, desire	*more milk*	*mehr milch* [more milk]	*yeshchë moloko* [more milk]	*anna Rina* [give Rina]	*miya tamtam* [give-me candy]	*mai pepe* [give doll]
Negate	*no wet*	*nicht blasen* [not blow]	*vody net* [water no]	*ei susi* [not wolf]	*beda onge* [my-slasher absent]	*le' ai* [not eat]
Describe event or situation	*Bambi go*	*puppe kommt* [doll comes]	*mam prua* [mama walk]	*Seppo putoo* [Seppo fall]	*odhi skul* [he-went school]	*pá u pepe* [fall doll]
Indicate possession	*my shoe*	*mein ball* [my ball]	*mami chashka* [mama's cup]	*täti auto* [aunt car]	*kom baba* [chair father]	*lole a' u* [candy my]
Modify, qualify (attributive)	*pretty dress*	*milch heiss* [milk hot]	*mama khoroshaya* [mama good]	*rikki auto* [broken car]	*piypiy kech* [pepper hot]	*fa'ali'i pepe* [headstrong baby]
Question	*where ball*	*wo ball* [where ball]	*gde papa* [where papa]	*missä pallo* [where ball]		*fea Punafu* [where Punafu]

Notes: Luo is spoken in Kenya. The order of the two words in each "sentence" is generally fixed in all languages but Finnish, in which children are free to use both orders for some types of utterances.

Source: From Slobin, Dan I., *Psycholinguistics*, 2nd ed. Copyright © 1979. Table 4-2, pp. 86–87. Adapted by permission of Professor Dan Slobin.

Learning the Rules

One of the most interesting aspects of early grammar acquisition is the way children learn how to modify the meanings of the words they use, an accomplishment that also illustrates the close ties between semantic and grammar development. Roger Brown (1973), in his classic longitudinal study of Adam, Eve, and Sarah, followed these three children from 2 to 4 years of age and noted, among many other things, that they acquired certain morphemes in a regular order. For example, during this period, the children began to use qualifiers that indicate plurality or a possessive relationship. Table 7-6 lists the 14 morphemes that Brown studied in the order in which his young participants acquired them. Although Adam, Eve, and Sarah each acquired these morphemes at a different rate of speed, the order in which each child acquired them was the same.

Notice that the order in which these morphemes are acquired is sensible: Simpler morphemes are acquired earlier than more complex ones. For example, plural forms, like -s, are learned before the copula (meaning a linking word) be. Similarly, Golinkoff, Hirsh-Pasek, and Schweisguth (2001) found that children began to understand mor-phemes—for example, they learn that -ing is a morpheme generally used with actions—much earlier than they can produce the same morphemes. In Chapters 8 and 9, we will see that this same general principle of progressing from the simple to the more complex characterizes children's cognitive development as well.

Slobin (1985) suggests that children go through four phases in their application of grammatical rules like the use of plurals. In phase 1, they try but fail. In phase 2, they succeed in memorizing some of the irregular verbs, such as broke and went, but do not yet acquire a grammatical rule. This kind of learning, of course, is quite inefficient. Imagine how time-consuming it would be if children had to learn separate, specific rules for each new word that they encountered. They might learn, for example, that two dogs is expressed as dogs, but they'd have to learn in a separate lesson how to pluralize other words such as house. In Slobin's third phase, children learn general grammatical rules that can be used with new as well as familiar words. Only in the fourth phase, however,

	Form	Meaning	Example
1.	Present progressive: -ing	Ongoing process	He is sitting down.
2.	Preposition: in	Containment	The mouse is in the box.
3.	Preposition: on	Support	The book is on the table.
4.	Plural: -s	Number	The dogs ran away.
5.	Past irregular: e.g., went	Earlier in time relative to time of speaking	The boy went home.
6.	Possessive: -'s	Possession	The girl's dog is big.
7.	Uncontractible copula be: e.g., are, was	Number; earlier in time	Are they boys or girls? Was that a dog?
8.	Articles: the, a	Definite/indefinite	He has a book.
9.	Past regular: -ed	Earlier in time	He jumped the stream.
10.	Third person regular: -s	Number; earlier in time	She runs fast.
11.	Third person irregular: e.g., has, does	Number; earlier in time	Does the dog bark?
12.	Uncontractible auxiliary be: e.g., is, were	Number; earlier in time; ongoing process	Were they at home? Is he running?
13.	Contractible copula be: e.g., -'s, -'re	Number; earlier in time	That's a spaniel.
14.	Contractible auxiliary be: e.g., -'s, -'re	Number; earlier in time; ongoing process	They're running very slowly.

Table 7-6

English-speaking children's first 14 morphemes in order they were acquired

Source: Based on Brown, 1973.

BOX 7-3
Child Psychology in Action

LANGUAGE LEARNING IN THE DEAF

Deaf children learning American Sign Language (ASL) produce word combinations very similar to those produced by hearing children around the world (Goldin-Meadow, 2006; Lederberg et al., 2000; Meier & Newport, 1990). Compare the examples in Table 7-7 with those in Table 7-5: In both the deaf child's phrases and those uttered by hearing children, we see locating and naming, indicating possession, making a demand, and describing or modifying. (For the ASL signs for some of the words in Table 7-7, see Figure 7-6.) Among deaf children, the length of utterances increases steadily, just as it does among hearing children, and like hearing children, those who use sign language tend to over-extend words (Bellugi et al., 1993; Petitto, 1993). Nor are young signing children always accurate, as with the early words of their speaking peers. For example, intending to point to their mouths in signing (which might indicate "speech" or "speaking"), children may miss and point to their chins (which could mean "preference" or "favorite").

Although the steps that children follow in learning language, whether gestural or spoken, are similar, evidence suggests that deaf children may learn sign language faster and earlier than hearing children learn spoken language. In a longitudinal study of 13 infants being reared by deaf parents, Bonvillian and his colleagues (Bonvillian et al., 1983) found that these children learned signs several months earlier than hearing children learned words. Most hearing children do not

Table 7-7 Some two-word combinations in a deaf child's signing

Sign	Meaning
Daddy work	"Daddy is at work."
Barry train	"That's Barry's [her brother's] train."
Bed shoes?	(Asking where her slippers are)
Daddy shoe	(Attempting to persuade her father to take off his shoes and play in the sand)

Source: Meier & Newport, 1990.

utter their first recognizable word before the end of the first year. The signing infants produced their first recognizable sign by the time they were 9 months old. By the age of 17 months, these children began to combine two or more signs; again, they were 2 to 3 months ahead of hearing children. However, the advantage doesn't appear to last. After 2 years of age, the differences between signers and speakers disappear (Bonvillian et al., 1990). What might account for the early discrepancy? The most plausible explanation is that the motor centers of the brain develop more rapidly than do the speech centers. When the latter catch up with the former, language learning may proceed at a similar pace in both deaf and hearing children as Dale (1976) explained.

do children—at 7 or 8—finally approach adult usage, recognizing when to apply these rules. A crucial achievement of this last phase is learning when *not* to apply a rule.

Adult language is full of irregularities and other exceptions to the rules. When children are first learning a language, they ignore these irregularities and rigidly apply the rules they learn. In **overregularization** of rules, children apply a rule for forming regularities in cases where the adult form is irregular and does not follow the rule. For instance, a young child may start out using the words *went* and *came* correctly, but after learning that *-ed* forms the past tense for many verbs, he may begin to use this ending for all verbs, producing *goed* and *comed* (Slobin, 1985). Similarly, a child often uses the word *feet* until she learns the regular plural ending; then she may switch to *foots* or sometimes *feets*. Overregularization is found not only in the United States but in other countries, where children applied the rules they learned broadly to form novel "regularized" words and phrases that did not occur in adult speech (Slobin, 1982).

Despite great interest in overregularization among researchers, questions remain about why and how often children overregularize language in their speech. Additionally, it has been shown that some children are more likely than others to overregularize language (Maratos, 1993), which suggests that children's interest in or skill at the rules of

overregularization The application of a principle of regular change to a word that changes irregularly.

Father, Dad
With the palm of the right hand facing left and fingers up, tap the thumb on the center of the forehead.

Work, employment
With both hands in form of fist, tap the heel of the right hand on the back of the left hand, twice.
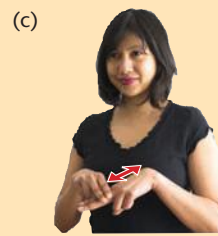
Train, railroad
Using the index and middle fingers of both hands, move the right two fingers back and forth several times on top of the left two fingers.

Shoes
With both hands in the form of fist, hit the thumb sides of both hands together several times.

Figure 7-6

Some signs in American Sign Language

In early two-word communications like those listed in Table 7-7, a deaf child might combine the signs in (a) and (b).

Source: Adapted from Costello, 1983.

In spite of these early differences in rate of language acquisition, the really important aspects of language and the really important abilities the child brings to the problem of learning are independent of the modality in which the linguistic system operates. Language is a central process, not a peripheral one. The abilities that children have are so general and so powerful that deaf children proceed through the same milestones of development as do hearing children. (p. 59)

In fact, because learning signs is a bit easier than learning to say words, largely due to factors related to brain development and the requirements of coordination that each of these communication systems entails, even hearing babies have been found to use signs earlier than speech to communicate (Acredolo & Goodyn, 1998). Teaching hearing children signs and gestures so they can communicate with their parents before children are skilled with spoken language has become an increasingly popular way for parents and young children to interact.

language may vary individually. Finally, some researchers suggest that it is not language development per se that explains overregularization. Rather, memory development may contribute to this behavior because learning all the complexities and rules of language places great demands on memory. Because young children are developing memory skills at the same time they are developing language, these processes may influence each other, and behaviors such as overregularization may be a result (Marcus, 1995).

Approaching Formal Grammar

In the third year of life comes "a grammatical flowering" (deVilliers & deVilliers, 1992, p. 378). Simple sentences start to become subtle and more complex as children show early signs of understanding the rules of adult grammar (Valian, 1986). Among children's many achievements is the beginning use of auxiliary and modal verbs (deVilliers & deVilliers, 1992). *Mode*, or "mood," is the capacity of verbs to convey factual statements, expressions of possibility (e.g., the subjunctive), or imperatives. One of the auxiliary verbs children begin to use at this stage is the verb *to be*, which appears in

Animated conversations like this one are a sign of the "grammatical flowering" that generally characterizes the third year of life.

many English sentence structures and thus opens up the possibility of many new forms of expression. Children begin to use tenses other than the present: "I kicked it." And they begin to use pronouns and articles and even begin to create complex sentences: "The teddy and doll are gonna play" (deVilliers & deVilliers, 1992, p. 379). Let us take a closer look at two of these grammatical milestones: questions and negatives.

QUESTIONS   To express a question, young children may first use an assertion such as "sit chair" by simply raising their voices at the end to indicate that they are asking a question (deVilliers & deVilliers, 1979). In the latter part of the third year, children begin to ask "wh" questions—those that start with the words *what, when, who, why*, and *which*—as well as questions that begin with *how*.

Between ages 2 and 3, children's "wh" constructions may fail to include the auxiliary verb, and they can be heard to say things such as "Where you going?" A little later, they include the auxiliary without inverting it—for example, "Where you are going?" Finally, they incorporate all the rules for producing a "wh" question—for example, "Where are you going?"

An important feature of "wh" questions is that they enable children to learn new things. Callanan and Oakes (1992) asked parents of 3-, 4-, and 5-year-old children to keep diaries over a 2-week period of their children's "why" and "how" questions. They found, as every parent knows, that the frequency of these questions increases over these years. They also found that at all ages these questions tended to be complex; that is, children rarely asked about the world just by stating "why" or "how." Rather, these questions usually included referents, ideas, and observations—for example, "Why is the sky blue?" or "How does the telephone know which house to call?" Children use their emerging skill at questioning as an important tool for obtaining knowledge. Again, we see that language and cognitive development are closely linked in promoting the child's overall progress.

NEGATIVES   Some of the earliest evidence of children's expression of negation comes in nonverbal form, for example, by shaking their heads. The simplest verbal forms involve the word *no* either alone or affixed to the beginning of a phrase; for example, a child may say "No doggie" to mean the dog is not here. As children develop, they learn to form different kinds of negatives, and three distinct types of negation

appear in a particular developmental order (Bloom, 1970; Tager-Flusberg, 1997). First, children are able to express the nonexistence of something (e.g., "All gone"), then they become capable of rejecting something (e.g., "No wash hair"), and lastly they are able to deny that something is true (e.g., "That not Daddy").

Language researchers have found that these same types of negations appear in the same order in Japanese as in English (Bloom, 1991; Clancy, 1985). As children's language skills develop, more complex forms of negation appear that include auxilary verbs—for example, "I didn't do it" or "He isn't my friend."

The development of questions and negatives is only part of a wide range of grammatical accomplishments during the preschool years. By 3 years of age, children begin to use complex sentences, and progress is gradual but orderly. At first, children tack on relative clauses—for example, "See the ball that I got." It's only later that they interrupt a main clause with a subordinate clause: "The owl who eats the candy runs fast" (Maratsos, 1998; Slobin, 1985), and they compose complex utterances like, "Where did you say you put my doll?" (deVilliers & deVilliers, 1992, p. 379). Although most fundamental forms of grammar are acquired by 4.5 to 5 years, the process of grammar acquisition continues to develop through the school years (Maratsos, 1998).

How Children Make Sense of What They Hear

Although we have been discussing language production, it is important to remember that productive and receptive language are closely linked. Several researchers have shown that at a very early age, children are able to understand sentences that are more complex than those they can produce. This understanding is aided by syntax, which provides clues about the meanings of nouns (or object words) and verbs (or action words). For example, some types of verbs appear in some sentences and not others (Hoff, 2005). Verbs such as *hit* and *hug* refer to an action that one person does to another, and therefore, such verbs usually appear in sentences in which the verb is preceded by a noun, the doer of the action, and followed by a different noun, the recipient of the action (e.g., *Joe hugged Molly*). Other verbs, such as those that refer to an action with no recipient, such as *laugh* or *slip*, appear in sentences in which there is just one noun, the doer (e.g., *Paul laughed*). According to Gleitman and her colleagues (Fisher et al., 1994; Gleitman, 1990), children use a kind of "syntactic bootstrapping" to figure out word meaning. According to this theory, once children learn how to parse utterances into syntactic units, they use this knowledge to distinguish the meanings of verbs they may not yet understand. In other words, they use what they already know about syntax to support, or bootstrap, their learning and comprehension (Naigles, 1990).

According to Goodman (1989), even 1.5- to 3.5-year-old children use semantic and syntactic cues to identify spoken words. In a sentence completion task, Goodman presented children with spoken sentences and asked them to fill in a final missing noun. For example, to the utterance "Mommy feeds the ____," children responded "baby." In a word identification task, children listened to complete sentences and pointed to pictures to identify the final word in each sentence. In one condition of this task, the word called for by the sentence meaning was among those pictured, but the word actually spoken was represented by another picture. For example, children listened to the sentence "Ann drives the duck" and then looked at pictures of a duck, a truck, a dog, and a book. Although the word spoken was *duck*, children chose the truck. When the children heard the sentence "The man sees the duck," however, they chose the duck picture.

Does the ability to use semantic and syntactic information improve with age? Entwisle and Frasure (1974) demonstrated that this is very probably so. Using a "noisy telephone" technique, in which background noise was used to make auditory material difficult to hear, these researchers asked groups of children 6, 7, 8, and 9 years old to listen to three sentences. The children were then asked to repeat the sentences as accurately as possible. Because the noise blocked out parts of the sentence, the children had

Figure 7-7

Learning to use semantic and syntactic clues

The more syntactic and semantic clues offered by sentences heard against background noise, the more successful children were at repeating the sentences. All children had difficulty with the *scrambled* sentence that lacked any clues, but when clues were present, as in the *meaningful* and *anomalous* sentences, older children made better use of them than younger children.

Source: Entwisle & Frasure, 1974.

Words repeated correctly (percent)
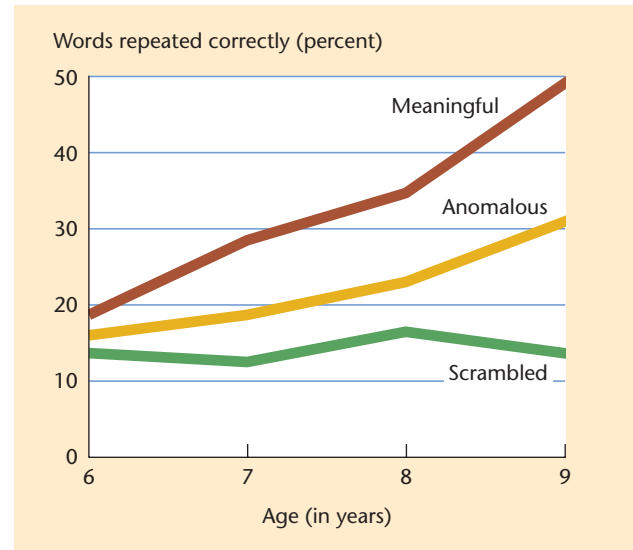
to rely on their knowledge of how sentences are generally formed to fill in the missing words. Here are the sentences:

> Bears steal honey from the hive.
>
> Trains steal elephants around the house.
>
> From shoot highways the passengers mothers.

In the *meaningful* first sentence, both semantics and syntax are correct. The *anomalous* second sentence is syntactically correct, although it makes no sense. In the *scrambled* last sentence, both syntax and semantics are jumbled, making this presumably the most difficult sentence for children to reproduce. As you can see from Figure 7-7, the older the child, the more he or she was able to benefit from the available syntactic and semantic clues. At all ages, the more such clues the children had, the better they did; all age groups experienced similar difficulties with the sentence in which these clues were totally absent.

Children's comprehension of many complex constructions remains poorly understood. We still don't know when or how children are able to understand "John was thought by Mary to have been scratched by Sam" (Maratsos, 1983). Children continue to develop in both their production and understanding of complex syntax well beyond the early school years; for example, listening to a third-grade English lesson and a college seminar on Shakespeare clearly indicates that both comprehension and usage continue to develop for many years.

LEARNING THE SOCIAL
USES OF LANGUAGE

Language, by its very nature, is a social phenomenon; it enables the child to communicate with other people. What becomes very important as children develop, therefore, is the decision as to what words and phrases to use in differing social situations. The rules for this usage, which we have already identified, are known as *pragmatics*. Speakers have a variety of pragmatic forms, such as getting people to do things for them and thanking people for their help, and they need to know how to express these forms appropriately depending on the situation and the other people involved. When verbal expressions clearly refer to situations rather than to just one object or action, we call these expressions **speech acts**.

speech acts One- or two-word utterances that clearly refer to situations or to sequences of events.

Communication becomes **discourse**, or socially based conversation, when children are able to listen and respond to another's speech. The latter achievement includes the ability to recognize one's own lack of understanding and to request additional information. In this section, we begin by looking at some of the rules of pragmatics and then turn to the ways children learn first to communicate and then to be good listeners.

The Rules of Pragmatics

Even when a child has mastered meaning and syntax, she is not yet fully equipped to be an effective communicator. She must learn another set of rules—namely, how to use language appropriate to a given situation. To be an effective speaker requires a complicated set of skills. First, the child must engage the attention of her listeners so they know that she wants to address them and that they should listen. Second, effective speakers have to be sensitive to listeners' feedback. If children don't know when others fail to understand them, or don't know how to change their messages to make themselves clear, they are not going to be very successful communicators. Third, speakers must adjust their speech to the characteristics of their listeners, such as age and cultural and social background. For example, the fifth-grade child must learn that in addressing his classmates, he can use words and concepts that he can't use when he makes a presentation to kindergartners. Being a good communicator requires that you adapt your message to consider "who the listener is, what the listener already knows, and what the listener needs to know" (Glucksberg et al., 1975, p. 329).

A fourth rule requires that children learn to adjust their speech to suit the situation. Children and adults learn to talk differently on a playground or street than they do in a church or a classroom. A fifth guideline points out that communication is a two-way process. To participate in a conversation, one must be not only an effective speaker but also a skilled listener; learning to listen is just as important as learning to speak. A sixth rule underlines the importance of understanding one's own communicative skills; that is, children must learn to evaluate both their own messages and the messages they receive from others for clarity and usefulness. They must also learn to correct their own messages when necessary and to let another speaker know when they do not understand the speaker's communication (Glucksberg et al., 1975).

How early do children acquire these various communication skills? How do these skills develop and how do children use them across different situations? We explore these questions next.

Learning to Adjust Speech to Audience

By 2 years of age, children are remarkably adept both at engaging the attention of a listener and at responding to listener feedback. Videotaping ten 2-year-olds in their day-to-day interactions in a nursery school, Wellman and Lempers (1977) recorded 300 referential communicative interactions in which the communicator's intent was to point out, show, or display a particular object or referent to another child. The results were striking in their demonstration of these children's competence as speakers. The toddlers addressed their listeners when both were either interacting or playing together (82%) or when the listeners were at least not involved with someone else (88%). The children also directed communications to others when they could see each other (97%), when they were physically close to each other (91%), and to a lesser extent, when the listeners were looking directly at them (41%). Similarly, the children made sure that when they spoke, they were close to the thing they were talking about (92%) and that the listener was also close to the thing referred to (84%) to make it more likely that the listener would understand the message.

In light of these precautions, it is not surprising that these young speakers were very effective in engaging their listeners. In fact, 79% of messages met with an adequate

response from listeners. Moreover, speakers showed an awareness that certain situations were particularly difficult and adjusted their communications accordingly. They communicated more in difficult situations—for example, when there was an obstacle between the listener and the thing referred to. Finally, these children were responsive to feedback from their listeners. For example, more than half the time, when the speakers received no response, they repeated their messages in some form, but they repeated messages only 3% of the time when they received an adequate response. In sum, these 2-year-olds were surprisingly sophisticated speakers.

Children as young as 2 years of age learn to adjust their speech when talking with other children of different ages. In several studies (Dunn, 1988; Dunn & Kendrick, 1982), 2- and 3-year-olds used more repetitions and more attention-eliciting words (*hey, hello*, and *look*) when talking to their baby brothers and sisters than they did when addressing their mothers. Researchers (Gelman & Shatz, 1977; Shatz, 1983, 1994) have also found that children make the same kinds of adjustments when they speak to people outside the family. Contrast the following statements directed at an adult and a child (Shatz & Gelman, 1973):

> *[Four-year-old to unfamiliar adult]:* You're supposed to put one of these persons in, see? Then, one goes with the other little girl. And then the little boy. He's the little boy and he drives. And then they back up. And then the little girl has marbles. . . .

> *[Four-year-old to unfamiliar, younger child]:* Watch, Perry. Watch this. He backing in here. Now he drives up. Look, Perry, look here. Those are marbles, Perry. Put the men in here. Now I'll do it. (p. 13)

Despite the sophisticated level at which children can communicate, children's communicative competence does face some limitations. Preschoolers, for example, are more effective in a one-to-one conversation; they do less well when they must compete for their turn with adults and other children (Ervin-Tripp, 1979). Young children also are more competent when speaking about single familiar objects that are present in their immediate environment than when speaking about absent objects (absent in time or space) or their own feelings, thoughts, or relationships (Dunn, 1988; Shatz, 1983, 1994).

How do children acquire the ability to converse on an increasingly sophisticated level? Learning the social aspects of language is similar to learning other forms of social behavior. Children learn by observing people and through direct instruction from parents and teachers (Bandura, 1989; Dunn, 1988). They also learn by listening to people talk about conversations—who said what to whom and how this or that person responded (Miller & Sperry, 1987).

Much of what children learn from parents about the appropriate use of language involves the acquisition of social conventions. For example, one of the child's first lessons in formal communication involves learning how to use polite words and phrases, such as *hello, goodbye, please*, and *thank you* (Grief & Gleason, 1980); these simple social routines are common to all cultures (Schieffelin & Ochs, 1987). Children must also learn when, where, and to whom it is appropriate to express negative feelings and thoughts, such as anger (Miller & Sperry, 1987).

Learning to Listen Critically

To learn from a communication, you must be able to recognize when a message sent to you is not clear. Young children are often unaware that they do not understand a message. In one experiment, Markman (1977) gave first and third graders instructions to a game that left out critical information essential to playing the game. The third graders noticed the inadequacy of the instructions more readily than the younger children; indeed, the latter were generally unaware that information was missing and had to be urged to try to play the game before realizing that they didn't know enough to do so.

However, if the task is simple, even 3-year-olds can recognize an ambiguous message when they hear one and can act in appropriate ways to resolve the communication gap. In one study (Revelle et al., 1985), an adult made a variety of requests of 3- and 4-year-olds during a play session. Sometimes, the requests were ambiguous—for example, the investigator might ask for a cup without specifying which of four different cups she or he wanted. In other cases, a request was impossible—"Bring me the refrigerator" (the only refrigerator available was a real and very large one). Even the 3-year-olds showed clearly that they recognized when a request was problematic, and preschoolers knew how to remedy the communication problem by requesting more information. For example, when asked to bring the refrigerator, more than one 3-year-old asked, "How? It's too heavy." Revelle and associates suggest that the essential skills in monitoring communication are realizing that problems can arise, recognizing problems when they do occur, and knowing how to fix them. Three- and 4-year-olds seem to possess all of these fundamental monitoring skills; as we'll see later, all are important in the development of metalinguistic awareness.

Children can be taught to be more effective listeners, but there may be a minimal age at which children can learn to listen critically. Research has shown that when 6- to 10-year-old children were encouraged to ask a speaker questions to clarify his or her communication, they performed more effectively than children who were not given this lesson in listening (Cosgrove & Patterson, 1977; Patterson & Kister, 1981). Because 4-year-olds did not benefit from this instruction, this type of listening strategy may be a moderately advanced communication skill.

Learning to listen carefully to another's message is an important achievement, and adults can help children learn to attend to objects and events in the environment.

METALINGUISTIC AWARENESS: KNOWING ABOUT LANGUAGE

An important achievement in language development, and one of the latest to develop, is the understanding of how language works. That is, children become aware that they know language and can think and talk about language itself.

Metalinguistic awareness is the understanding that language is a rule-bound system of communicating. It includes the ability to talk about the various properties and uses of language as well as to monitor language as it is used (Whitehurst & Lonigan, 1998). This understanding and ability emerge well after children are proficient at producing language (Bullinger & Chatillon, 1983).

To test children's understanding of grammar, for instance, we can ask children to judge between grammatical and ungrammatical sentences and acceptable and unacceptable syntax. In one investigation, deVilliers and deVilliers (1972), using the technique of asking children to teach a puppet to talk correctly, tested children's ability to judge and to correct word order in sentences describing specific actions. Sometimes, the puppet spoke in correct word order; for example, "Eat the cake." At other times, the puppet reversed word order: "Dog the pat." And at still other times, the puppet used correct syntax but described actions that were impossible: "Drink the chair." The children both told the puppet whether the sentence was right or wrong and then helped the puppet rephrase it the "right way." The researchers found a clear relation between the children's level of language development and their metalinguistic awareness; as

metalinguistic awareness The understanding that language is a rule-bound system of communicating.

phonological awareness The understanding of the sounds of a language and of the properties, such as the number of sounds in a word, related to these sounds.

their ability to produce and comprehend sentences increased, their awareness increased as evidenced by their ability to correct the puppet's "wrong" utterances (deVilliers & deVilliers, 1992).

Phonological awareness is the specific aspect of metalinguistic awareness related to the sounds of language. This understanding includes knowledge of the sounds of language and of properties related to these sounds, such as how many sounds are in a word. Rhyming is a particularly interesting instance of phonological awareness because of the delight children seem to take in discovering that words can rhyme and in learning how to make this happen. Children as young as 2 years of age have been observed making rhymes. Learning and passing on oral rhymes are common in the preschool and early school years. Here is a rhyme that was common among children in England in the early 1900s (Opie & Opie, 1959, p. 17):

> Mrs. White had a fright
>
> In the middle of the night
>
> She saw a ghost eating toast
>
> Half-way up the lamp post

The fact that a rhyme, like this one, may make little sense does not seem to bother children; it even seems to make it more appealing. Children's interest in and use of rhymes reflect phonological awareness and can help create social connections and enjoyment for children. Phonological awareness also has significance for learning to read. Research has shown that children's phonological awareness before they enter school is positively related to success in reading both in the early grades and later (Goswami, & Bryant, 1990).

BILINGUALISM AND LANGUAGE DEVELOPMENT

bilingualism The acquisition of two languages.

Today, in many parts of the United States, a majority of children do not speak English as their first language. **Bilingualism** is the acquisition of two languages. For some children, bilingualism involves learning two languages simultaneously, such as when one parent speaks one language and another parent speaks a second language to the child. For other children, bilingualism entails learning two languages sequentially—for instance, when one language is spoken at home when the child is young and a second language is acquired when the child goes to school. What are the implications of bilingualism for the language acquisition process? Although some experts have expressed concern that learning two languages interferes with children's language learning more generally, this may not be the case. Children who learn two languages may learn both languages more slowly than some of their peers learn one language; however, this gap disappears as children develop. Additionally, studies of children between 8 months and 2.5 years of age found that bilingual and monolingual children had comprehension vocabularies of about the same size (Pearson et al., 1993). In contrast, children who are 5 or older when they learn to speak two languages appear to have smaller comprehension vocabularies than monolingual children (Bialystok, 1997; de Houser, 1995; Hakuta, 1986). Although a bilingual child may have in each of her languages a vocabulary that's smaller than a monolingual child's vocabulary, her total production vocabulary—her vocabularies in both languages combined—may be equal in size to the monolingual child's production vocabulary (Pearson et al., 1993).

The way two languages are learned differs depending on whether children learn the languages simultaneously or in sequence. When very young children learn two languages simultaneously, they rely on language sounds, such as consonants, longer than monolingual children do (Fennell et al., 2007). The researchers think that this process may be adaptive in that bilingual children can use the distinct language sounds to help them deal with the cognitive load of learning words in two languages. In addition,

research (Hirsch & Kim, 1997) has suggested that when children learn two languages simultaneously, from infancy, the languages share the same brain region (called *Broca's area*) that is responsible for the execution of speech as well as for some grammatical aspects of language. However, when children learn a second language later in childhood or adulthood, this brain region is divided, with a distinct area reserved for the second language. If these findings are valid, we might speculate that they underlie the apparent greater ease of learning a second language early in childhood. Perhaps future studies will shed more light on this issue.

One important determinant of how well children master each of two languages is how often they are exposed to each one. Very few children, for example, are exposed to equal inputs of Spanish and English. As researchers found in Miami, a city that is home to a large Cuban population, children who received less than 25% of their language input in Spanish were unlikely to become competent Spanish speakers (Pearson et al., 1997). As in the case of many other kinds of lessons, exposure is an important determinant of how well children will learn.

Learning a second language often has specific benefits. Studies have shown that children who learn two languages are more cognitively advanced than monolingual children. Children skilled in two languages have better concept formation, are more flexible in their thinking, have greater morphological awareness, and have better attentional control (Bialystok, 1999; Deacon et al., 2007; Diaz, 1983, 1985; Goncz & Kodzopeljic, 1991; Rosenblum & Pinker, 1983). Bilingualism also appears to facilitate the development of metalinguistic awareness (Bialystok, 1991). Not only do language and cognitive development benefit from bilingualism, but children's social behavior may also improve. Lambert (1987) studied English-speaking children who participated in a French language immersion program in Quebec, Canada. In comparison to control pupils, the "immersion" students had less stereotyped attitudes toward French Canadian peers. Moreover, the immersion experience resulted in more mature and productive "social perspectives." For example, these children offered more sophisticated solutions to solving cultural differences between French and English Canadians.

Bilingual education in the United States has not been without controversy, however. It is a highly politicized topic that has been viewed differently at various points in history and has even been subject to regulation through the courts. Researchers have studied how effective bilingual programs are in helping children learn class material and succeed in school, yet results are not as conclusive as one would hope. One reason it is difficult to obtain a clear understanding is that bilingual education programs vary across regions of the country, school districts, instructional levels, and even among classrooms in the same school (Faltis, 1997; Oller & Eiler, 2002).

Making the Connections 7

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 7 and discussions in other chapters of this book.

Chapter 7 Language and Communication	→	**Learning a new language is easier before puberty.** In Chapter 5, "The Child's Growth: Brain, Body, Motor Skills, and Sexual Maturation," p. 170
	→	**Consistent with Piaget's description, young children's language learning appears egocentric.** In Chapter 8, "Cognitive Development: Piaget and Vygotsky," p. 285
	→	**Helping children achieve mastery of pragmatics through coaching improves social interaction with peers.** In Chapter 12, "Expanding the Social World: Peers and Friends," p. 457

In sum, learning two languages may not be as problematic as some thought but rather an advantage and an opportunity. Evidence of the benefits of bilingualism must be interpreted with caution, however. Children who are successful at multiple languages may be a select group (Diaz, 1983). We do not know how many children try to learn several languages and fall short of becoming bilingual. In other words, we don't know whether the samples used to date in studying the benefits of bilingualism are fully representative.

SUMMARY

- Language serves a variety of purposes for the developing child. It facilitates interpersonal communication, helps organize thinking, and aids in learning. The development of **communicative competence** is an important part of children's language learning.

- Communication requires us to use both **productive language**, transmitting messages to others, and **receptive language**, receiving and understanding messages others send us.

The Components of Language: Phonology, Semantics, Grammar, and Pragmatics

- We can divide the study of language into four areas. **Phonology** describes a language's systems of sounds, or the way basic sound units, called **phonemes,** are connected to form words. **Semantics** is the study of the meaning of words and sentences.

- **Grammar**, which describes the structure of a language, includes **syntax** and **morphology; morphemes** are a language's smallest units of meaning. **Pragmatics** consists of rules for the use of appropriate language in particular social settings.

Theories of Language Development

- The learning view explains language development by the principles of reinforcement and imitation. Although learning principles seem to be important in modifying language usage, they do not explain how children acquire the enormous number of reinforcement linkages required to communicate effectively. Nor do they account for the regular sequence of language development, children's creative utterances, or the fact that children learn to speak grammatically even when parents fail to reinforce grammar.

- According to Noam Chomsky's nativist approach to language development, children have an innate **language acquisition device (LAD)** that enables them to learn language early and quickly. Support for this position comes from the finding of certain universal features in all languages, such as the use of a relatively small set of sounds and the combination of words into sentences, as well as from evidence that there may be a **critical period** for learning language. Critics point out that there is little agreement about the exact nature of the early grammatical rules that children learn and argue that language is not acquired as rapidly as nativists once thought. They also point out that the wide range of grammatical and syntactic rules around the world argues against any sort of universality and that the nativist view ignores the social context in which language develops.

- Most modern theorists take an interactionist view, recognizing that children are biologically prepared for language but require extensive experience with language and communication for adequate development. According to this view, children play an active role in acquiring language by formulating, testing, and evaluating hypotheses about their languages' rules.

Facilitating Children's Language Development

- In proposing a **language acquisition support system (LASS)**, Jerome Bruner emphasizes the critical roles parents and other early caregivers play in the child's language development. American middle-class caregivers have been found to support a child's beginning language by using **infant-directed,** or **child-directed, speech**, or simplified language with their children, by playing nonverbal games with them, by using the technique of **expansion** to expand or add to children's statements, and by **recasting** children's incomplete sentences in grammatical form. However, some cultures do not use these techniques.

The Antecedents of Language Development

- Infants acquire early training in the give-and-take of conversation through "pseudodialogues" with their parents, and by the time they are 1 year old, they are highly skilled at nonverbal communication. Using **protodeclaratives** and **protoimperatives**, young children can make statements about things and get other people to do things for them.

- Infants' capacity for receptive language begins as early as the first month of life, as demonstrated in their **categorical speech perception**, the ability to discriminate among consonant sounds as well as their ability to recognize some vowel sounds by the age of 2 months.

- As children are exposed to their native languages, their abilities to distinguish and categorize phonemes are refined and specialized for the sounds of their own languages. Precursors to productive language include **cooing, babbling**, and **patterned speech**. Babbling occurs in many cultures, and the babbling of deaf babies is very similar to that of hearing infants.

Semantic Development: The Power of Words

- Children's acquisition of vocabulary proceeds in bursts, the first of these occurring at about a year and a half in the **naming explosion**. Children may learn object or naming words first. Aids to rapid learning of new words include a number of constraints that allow children to make judgments about a new word, such as knowing that it refers to a whole object or that it is different from other words they already know.

- Two errors that children sometimes make in early word use are **overextension**, when a child uses a single word to mean different things, and **underextension**, when a child restricts a word to only one representative of a category.

The Acquisition of Grammar: From Words to Sentences

- The one-word utterances that children begin to produce from about 1 year on are known as **holophrases** to indicate that these words often appear to represent a complete thought.

- Sometime between 1.5 and 2, children begin to use **telegraphic speech**, which generally includes only nouns, verbs, and adjectives. In **overregularization**, children apply rules for regular formations in all cases, including those where formations are properly irregular.

- At about the age of 3, children begin to form more complex sentences, showing signs of understanding some of the rules of adult grammar, including *"wh"* and *how* questions and how to form negatives.

- The process of acquiring grammar continues throughout the school years. Using a kind of "syntactic bootstrapping," children as young as 1.5 or 2 years old use semantic and syntactic cues to help them understand sentences.

Learning the Social Uses of Language

- Because language is a social phenomenon, children must learn to raise their level of communication beyond **speech acts** to true **discourse**, which includes a complicated set of skills such as engaging the listener, sensitivity to listeners' feedback, adjusting speech to characteristics of listeners and to particular situations, being a good listener, and how to let others know that their messages are unclear.

- Even preschoolers are remarkably sophisticated speakers, but because they have difficulty tracking multiple speakers and judging when it is their turn to speak, they are more effective on a one-to-one basis than in a group. Children improve their conversational sophistication through direct instruction and by observing and listening to others speak.

Metalinguistic Awareness: Knowing About Language

- When children achieve **metalinguistic awareness** at about the age of 10, they can both understand that language is a system of rules for communication and discuss the properties and uses of language. Although they can use many rules at an earlier age, they have difficulty separating words from the objects or events they represent and grasping the concept that words are elements of language.

- **Phonological awareness** appears earlier. Even preschool children have some understanding of the sounds of language and of how to use these sounds in different ways—for example, in creating rhymes.

Bilingualism and Language Development

- The evidence indicates that **bilingualism**, in which children learn two languages either simultaneously or sequentially, does not place children at a disadvantage in terms of language proficiency. In fact, learning two languages may have benefits, such as advanced cognitive skills, more flexibility of thought, and greater acceptance of peers from other cultural backgrounds.

EXPLORE AND DISCUSS

1. How do you think language development affects a child's social and emotional development?

2. Why is it important for a child's language development that she or he talk to adults as well as to other children?

3. Preschool children ask lots of *why* questions, sometimes even exhausting parents by the sheer number of their queries. If a child asked you a why question, such as "Why don't doggies cry?" or "Why are circles round?" how would you answer?

4. Is there an upper limit on the number of languages a child can learn to speak fluently? If so, what do you think this limit is, and why is there a limit?

Chinese painting, Northern Song dynasty, 1127–1279. *Children playing in an autumn garden*, 13th century CE.

National Palace Museum, Taipei

8.

Cognitive Development: Piaget and Vygotsky

How do we make sense of the world and all the people and objects in it? As adults, we take what we know about the world for granted. For example, when was the last time you wondered if an object continues to exist even when you can't see it? Or when you stopped to think about when and how you came to understand the symbols and gestures that people use to communicate with one another? **Cognition** is the term used to describe the mental activity through which human beings acquire, remember, and learn to use knowledge. Cognition includes many mental processes, such as perception, attention, learning, memory, and reasoning. It is such a broad concept that most of the topics covered in this book have some relation to cognition and its development. After all, human beings are thinking creatures, and much of our behavior reflects this fact. Research on cognitive development focuses specifically on how and when intellectual abilities and knowledge of the world first emerge in childhood and then change as a person grows older.

In this chapter and its companion, Chapter 9, we discuss several different approaches to the study of cognitive development. This chapter describes two of these approaches. First, we explore Jean Piaget's theory of cognitive development, which emphasizes developmental changes in the organization or structure of children's thinking processes. Then we consider Lev Vygotsky's sociocultural theory of cognitive development, which suggests that a child's interactions with the social world produce advances in thinking and understanding. In Chapter 9, we will explore the information-processing approach to cognitive development. This view concentrates on how people use their cognitive abilities to process information and carry out intelligent actions.

cognition The mental activity through which human beings acquire and process knowledge.

PIAGET'S THEORY OF COGNITIVE DEVELOPMENT

One of the most influential theories of cognitive development is that of the Swiss scientist Jean Piaget. Part of Piaget's influence on the field stems from the fact that his theory raised many interesting questions about intellectual development, which stimulated further research (Piaget, 1926, 1929, 1950, 1985). Piaget's theory is not without controversy, and many developmentalists have challenged both his methods and his conclusions. First, we describe Piaget's theory, and then we turn to the main criticisms of this approach.

Piaget began his own scientific research at a considerably younger age than most other people do. His primary interest was biology, and at the age of 10, he published his first scholarly article on the rare albino sparrow. As Piaget continued his studies, his interest in biology continued. However, he also became interested in philosophy, especially the study of knowledge, or *epistemology*. As a young man, Piaget pursued these interests by studying in Paris with Alfred Binet, who was working on the development of the first intelligence test (discussed in Chapter 10). As he helped Binet develop standardized IQ tests for children, Piaget made two important observations. First, he noticed that children of the same ages tended to get the same answers wrong. Second, he noticed that the errors of children of a particular age differed in systematic ways from those of older or younger children. Piaget's theory of cognitive development began to take shape as he thought about these errors; in particular, he thought they revealed distinct age-related ways of thinking and understanding the world. To study children's thinking, Piaget relied on two methods: interviews and observations. In his interviews, he would present children with a problem to solve or a question to answer and then ask them to explain their thinking. In his observational research, which he used mainly with very young children, he would present a problem and then watch how the children behaved as they tried to solve it.

constructivist view The idea that children actively create their understanding of the world as they encounter new information and have new experiences.

Jean Piaget spent his career studying the development of children's thinking. Working in his native Switzerland, Piaget based much of his theory on direct observations and interviews with children.

Piaget's theory, which became popular in the United States in the 1960s, proposed that over development the child acquires qualitatively new ways of thinking and understanding the world. For developmental psychologists, this theory was an attractive alternative to behaviorism, which was dominant at the time, for it focused on development and was based on observations of how children's cognitive abilities change as they grow from infancy to adolescence.

PIAGET'S MAIN TENET: THE CHILD ACTIVELY SEEKS KNOWLEDGE

Piaget argued that children play an active role in acquiring knowledge. Unlike behaviorism, in which the child passively waits for information (or stimuli) from their environments, Piaget argued that children actively seek out information. In addition, when children encounter new information, they actively try to fit it in with the knowledge they already possess. In other words, children construct their own understanding. Thus, this theory is referred to as a **constructivist view**.

Children need to develop a lot of knowledge about the world. Piaget was particularly interested in the development of knowledge about logical properties of the world. He set out to discover precisely how children at different points in their development think about how objects work and are related to one another. Piaget felt that children vary in the timing of when they develop this knowledge, and as a result, he provided approximate ages at which these developmental achievements occur. The Turning Points chart covers many topics discussed in this chapter (pp. 276–277) and includes a summary of Piaget's descriptions of the milestones of cognitive development.

Cognitive Organization

Piaget believed that, over the course of development, children's knowledge of the world gets organized into increasingly more complex cognitive structures. A *cognitive structure* is not a physical entity in the brain but an organized group of interrelated memories, ideas, and strategies that the child uses in trying to understand a situation. Piaget built much of his theory around the notion of the **schema** (plural, **schemas**), which is much like a concept. A schema is an organized unit of knowledge, and collectively, schemas form the knowledge base that a person uses to understand and interact with the environment.

As this definition suggests, a key feature of children's developing knowledge is that it is organized. **Organization**, for Piaget, entails the combination of simple mental structures into more complex systems. The organization of the knowledge that children have available at any given point in development enables the child to act on and interpret the world in a particular way. However, over time and with experience, this knowledge changes as the child attempts to understand new information and integrate it with his or her current knowledge. What emerges is a new organization of the child's knowledge, one that builds on the prior organization but extends this knowledge into new and more powerful directions. For instance, newborns possess many reflexes, such as sucking, grasping, and looking, all of which help the infant engage with and learn about the world. Initially, these reflexes are used in very specific ways. However, over time and with experience at sucking, for example, this schema changes and the newborn sucks differently on different objects and uses this schema for different purposes, such as exploring objects.

As children grow older and gain experience, they shift gradually from using schemas based on overt physical activities to those based on internal mental activities. Piaget called these mental schemas **operations**. With development, cognitive operations are used to alter and combine schemas to form more complex behaviors. When a substantial number of changes in schemas occur, Piaget claimed that children change from one organized way of understanding to an entirely new way of approaching the world. He described these large-scale organizational changes as stages and suggested that, over the life course, there are four stages of cognitive development. These stages are described in detail in the next major section of the chapter.

Cognitive Adaptation

Piaget proposed that children continually modify their schemas in relation to their own experiences and referred to this process as **adaptation**. Adaptation of a schema is a bit like a two-way street. It always involves determining how new information fits with existing knowledge as well as how existing knowledge may need to change to incorporate new information. Thus, Piaget described adaptation as composed of two processes, called assimilation and accommodation. To understand a new experience, children at first try **assimilation**; that is, they try to apply what they already know, their existing schemas, to the new experience. For example, as babies are confronted with new objects, they try to assimilate those objects to their looking-grasping-sucking schema.

schema (plural, schemas) An organized unit of knowledge that the child uses to try to understand a situation; a schema forms the basis for organizing actions to respond to the environment.

organization Combining simple mental structures into more complex systems.

operations Schemas based on internal mental activities.

adaptation Adjusting one's thinking to fit with environmental demands.

assimilation Applying an existing schema to a new experience.

Turning Points

THE CHILD'S COGNITIVE DEVELOPMENT FROM INFANCY THROUGH LATE CHILDHOOD

1 MONTH	The child becomes more efficient in the use of reflexes and can invite stimulation that allows this use; begins to adapt reflexive behaviors to different environmental conditions (e.g., sucks differently when nurses, drinks from a bottle, and has thumb or pacifier in mouth); shows recognition memory and can learn basic associations
2 MONTHS	Can anticipate: stops crying at sight of mother's breast or the bottle; expects and shows interest in animate behavior from humans; exhibits organized and selective looking; is interested in faces
3 MONTHS	Reacts to newness with body stiffening; quiets at sight of interesting toy; shows longer looking time at specific objects, investigative type of attention; has more voluntary control of looking; makes eye contact; social looking time increases; shows mutual gaze; face-to-face play becomes common
4 MONTHS	Repeats body actions that are pleasurable and satisfying; can reach out and gently probe objects; may be capable of simple grouping or categorization; reacts differently to some usual and unusual physical events
5 MONTHS	Visually follows an object as it moves out of direct line of vision; remembers pictures of faces; looking time increases; increasingly focuses attention on objects as well as people
6 MONTHS	Learns behaviors of familiar people; reacts to changes in familiar events
7 MONTHS	Explores objects by manipulation; drops objects from heights; may understand the notion of physical support; is more attentive when playing
8 MONTHS	Likes to make things happen and combines learned behaviors in this effort (e.g., shaking, banging, and dangling toys); displays basic problem-solving abilities; attends to play; often mouths toys as a way of exploring
9 MONTHS	Begins to remember without cues; uses knowledge to solve problems; seems aware of some cause-and-effect relations; recognizes that own actions may affect outcomes; gets other people to make things happen; able to look at more distant objects or images; exerts increased control over own actions; begins to show goal-oriented attention; can alternate attention between a person and an object
10 MONTHS	Explores inside and outside surfaces of toys; repeats play sequences with different toys; investigates textures, designs, or parts of toys; may be able to reason about hidden objects; looks intently at pictures
11 MONTHS	Uses tools to accomplish goals (e.g., uses a chair to stand up); is more easily entertained; begins to put knowledge of containment to use (e.g., tries to stack cups)

Sources: Flavell, 1963; Gauvain, 2001b; Kopp, 1994; Siegler & Alibali, 2005.

In most cases, they are successful, and object after object gets seen, grasped, and placed in the mouth.

However, sometimes babies encounter an object that is hard to assimilate. For example, a large inflated beach ball is very difficult to grasp and suck. Now the infant must modify her strategy for exploring objects (her looking-grasping-sucking schema) and adopt a new approach. Using the method of **accommodation**, she may hold the ball in her arms instead of her hands and lick it with her tongue instead of suck on it. In this way, she has modified an existing schema to fit the characteristics of the new situation. Assimilation and accommodation work together to organize children's knowledge and behavior into increasingly complex structures.

accommodation Modifying an existing schema to fit a new experience.

THE STAGES OF COGNITIVE DEVELOPMENT

Piaget viewed intellectual growth in terms of progressive changes in children's cognitive structures. Small changes in understanding and interacting with the world eventu-

1 YEAR	Actively plans to achieve a goal; examines objects comprehensively; uses imitative learning; deliberately introduces variations into play sequences; recognizes self in mirror; shows increased ability to look at complex visual stimuli; frequently looks at partner's face; starts to follow the glances and points of others
15 MONTHS	Continues to use systematic trial-and-error learning; is more aware of the functions of objects; may use dolls in play; recognizes and uses more cause-and-effect relationships; shows clear evidence of social referencing
18 MONTHS	Likes to experiment with the properties of objects; has better recall memory; has basic idea of "what should be" (e.g., puts lids on jars); recognizes that others have possessions; can use language to direct attention
21 MONTHS	To some degree, understands past, present, and future; uses scripts to organize activities into episodes; has some understanding of the idea of categories (e.g., colors)
2 YEARS	Can think symbolically and use language to direct attention and regulate behavior; can remember behaviors and reproduce an action long after observing it; can plan how to solve a problem mentally rather than use trial and error; begins to understand conservation; engages in fantasy play; recognizes that family members have specific roles; shows creative problem solving
3 YEARS	May be able to see the perspectives of others; may grasp conservation of number
4 YEARS	Begins to realize that others have different perspectives from own; may be able to understand part-whole relations; has memory span of about four items
5 YEARS	Has improved language and problem-solving skills; can use certain mental operations to solve problems but uses them intuitively, without a clear understanding of how and why they work
7 YEARS	Has achieved conservation of number, mass, liquid, length; begins to describe self in more abstract terms
8–10 YEARS	Can anticipate and consider the thoughts of others; achieves conservation of weight and area
11–12 YEARS	Achieves conservation of volume; begins to think deductively; can sort things in complicated combinations of attributes
12 AND BEYOND	Thinking becomes more flexible and capable of abstraction; can apply logic to ideas and problems that violate reality; can entertain many possible solutions of a problem

ally result in large-scale changes referred to as **stages of development**. Each stage is qualitatively different from the one that precedes it. Because stages are built through experience, children do not reach these stages at exactly the same ages. However, all children pass through the stages in the same order, and no stage can be skipped. This is because the attainments of earlier stages are the building blocks of the later stages and thus are essential for these later developments to emerge. Piaget saw intellectual development as occurring in four stages: the sensorimotor stage, the preoperational stage, the stage of concrete operations, and the stage of formal operations (see Table 8-1). According to Piaget, as children pass through these four stages, they change from infants who are incapable of mental operations and depend on sensory and motor activities to explore and learn about the world into emerging young adults capable of great flexibility of thought and abstract reasoning.

The Sensorimotor Stage

Dramatic achievements in children's intellectual development occur during the **sensorimotor stage**, which spans approximately the first 2 years of life. By interacting

stages of development
Comprehensive, qualitative changes over time in the way a child thinks.

sensorimotor stage
Piaget's first stage of cognitive development, during which children change from basic reflexive behavior to the beginnings of symbolic thought and goal-directed behaviors.

Table 8-1

Piaget's stages of cognitive development

Stage	Age Range (years)	Major Characteristics and Achievements
Sensorimotor	0–2	Child's thought is confined to action schemes and sensory experiences. He differentiates self from objects and other people; seeks stimulation and prolongs interesting sights and experiences; develops object concept, including object permanence; achieves basic understanding of causality, time, and space; grasps means-end relationships; begins to imitate behaviors previously experienced; engages in imaginative play; and late in the stage, shows the beginnings of symbolic thought.
Preoperational	2–7	Child begins to use symbols to represent objects and experiences and to use language symbolically; shows intuitive problem solving. Her thinking is semilogical, characterized by irreversibility, centration, egocentrism, and animism. She begins to think in terms of classes, see relationships, and grasp concept of conservation of numbers.
Concrete operations	7–12	Child is capable of logical reasoning, but this ability is limited to physically real and present objects; he grasps concepts of the conservation of mass, length, weight, and volume; his thinking is now characterized by reversibility, decentration, and the ability to take the role of another; he can organize objects into hierarchical classes (classification) and place objects into ordered series (seriation).
Formal operations	12 on	Child acquires flexibility in thinking as well as the capacities for abstract thinking and mental hypothesis testing; she can consider possible alternatives in complex reasoning and problem solving.

object permanence The notion that entities external to the child, such as objects and people, continue to exist independent of the child's seeing or interacting with them.

basic reflex activity An infant's exercise of, and growing proficiency in, the use of innate reflexes.

primary circular reactions Behaviors focused on the infant's own body that the infant repeats and modifies because they are pleasurable and satisfying.

secondary circular reactions Behaviors focused on objects outside the infant's own body that the infant repeatedly engages in because they are pleasurable and satisfying.

coordination of secondary circular reactions An infant's combination of different schemas to achieve a specific goal.

with their environment in active ways, children build on their basic reflexes and, from these origins, formulate a way of understanding and interacting with the world. By the end of infancy, around 2 years of age, children begin to form mental representations of objects and events and to use this information in developing new behaviors and solving problems.

Because so many cognitive changes occur in the first 2 years, Piaget divided the sensorimotor stage into six substages. One of the major cognitive achievements during the sensorimotor stage is the development of the object concept. We are not born with knowledge of objects. Rather, the child must construct this knowledge over the course of his or her experience with objects. According to Piaget, over the sensorimotor stage, infants learn about objects, including **object permanence**—the realization that objects continue to exist even when they are out of sight (Table 8-2). We discuss Piaget's thinking about the development of the object concept in the next several paragraphs, as we describe the six substages of the sensorimotor stage.

Substage 1: Basic Reflex Activity (0 to 1 Month)   In the substage of **basic reflex activity**, infants become more skilled in the use of their innate reflexes, such as grasping and sucking. Much of their initial exploration of objects occurs through involuntary reflexive behaviors. However, over the first month of life, many of these involuntary behaviors are replaced by behaviors that are similar in form but are controlled voluntarily. For example, between birth and 1 month of age, the grasping reflex gradually subsides, and in its place, the infant begins to use her hands voluntarily to grab onto objects that come within reach. In terms of the object concept, from birth to 1 month, infants look only at objects that are directly in front of them.

Substage 2: Primary Circular Reactions (1 to 4 Months)   This substage is called **primary circular reactions** because during this time, infants produce repetitive behaviors that are focused on the infant's own body. Babies repeat and modify actions they

Table 8-2

Acquiring the object concept and an understanding of object permanence

Substage		Age (months)	Child's Behavior
1	Basic reflex activity	0–1	Focuses only on objects directly in front of him
2	Primary circular reactions	1–4	Begins to operate on objects with action schemes; initially, this occurs accidentally and then becomes less accidental; looks a long time at place where an object disappeared but does not search visually or manually for the object
3	Secondary circular reactions	4–8	Can operate on objects and repeats actions toward objects; can visually anticipate where an object may be; searches for partially concealed objects
4	Coordination of secondary circular reactions	8–12	Will search for completely hidden objects but has tendency to repeat old actions by searching where objects were previously hidden (A-not-B error)
5	Tertiary circular reactions	12–18	Lots of trial-and-error experimentation with objects and how they move; searches for objects that have been concealed while she was watching but has difficulty if an object is displaced more than once
6	Inventing new means by mental combination	18–24	Object concept is fully developed; child searches and finds objects easily, even if the object has been hidden and displaced several times in a row before he is allowed to search

find pleasurable. Often, these actions begin by chance. For example, a baby may accidentally bring a finger close to her mouth and start sucking on it. Finding this behavior pleasurable, the infant attempts to reproduce the exact behavior—in this case, by seeking the finger to suck on it again and again. In terms of the object concept, infants display no comprehension that objects have an existence of their own. When a toy vanishes, they don't look for it. In fact, if the toy drops from a child's hand, he will stare at his hand rather than follow the falling object's path to the floor.

Substage 3: Secondary Circular Reactions (4 to 8 Months)   Not until the infant enters the substage of **secondary circular reactions**, at about 4 months of age, does he become interested in making things happen outside his own body. Secondary circular reactions involve repetitive behaviors focused on external objects, hence the term *secondary*. During this substage, the child's reactions are still circular; that is, he repeatedly engages in behaviors that please him. For example, the infant may shake a rattle, hear an interesting sound, shake the rattle again, and so on. The baby now is capable of combining schemas, such as grasping and shaking, to produce more complex behaviors. In terms of the object concept, the infant begins to show some awareness of the permanence of objects. A child will search visually for an object if its loss interrupts the child's actions, and she will anticipate the path of a moving object by looking at a location where it can be expected to appear. The child will search for a partially visible object, but not a covered one, and even if she watches as an object is covered, she will not attempt to retrieve it.

Substage 4: Coordination of Secondary Circular Reactions (8 to 12 Months)   In the substage called **coordination of secondary circular reactions**, the child develops more sophisticated combinations of behaviors that are directed toward objects and that reflect intentionality. At this point in development, Piaget held, the child is able to plan

This 7-month-old child seems quite absorbed in shaking his rattle. Using its different parts, he may get the rattle to make more than just one intriguing sound; this illustrates the substage of secondary circular reactions.

deliberately to attain a goal. Furthermore, schemas can be combined to reach these goals. For example, the child can now combine a hitting schema with her reaching and grasping schemas to move one toy out of the way so she can reach another. Thus, this substage marks the beginning of problem-solving behavior.

In terms of the object concept, the child now begins to search for completely concealed objects. However, although the child will search successfully for an object hidden in one location, if the object is moved to another location as the child watches, the child will continue to search in the first hiding place. This type of error is referred to as the A-not-B error because the child continues to search in the first hiding place, identified as A, even after, in the child's presence, the object is put in a second spot, identified as B.

tertiary circular reactions
Behaviors in which infants experiment with the properties of external objects and try to learn how objects respond to various actions.

Substage 5: Tertiary Circular Reactions (12 to 18 Months)   In the substage of **tertiary circular reactions**, children begin to experiment with external objects. Children use trial-and-error methods to learn more about the properties of objects and to solve problems. Unlike the earlier substages in which the child repeated *exact* behaviors, infants are now capable of producing *similar* but not exact behaviors. Piaget referred to infants who had acquired this capability, which allows for novel exploration, as "little scientists." For example, children at this age often experiment by deliberately dropping objects from different heights to see what happens to them.

In this substage, the infant finally displays understanding of the permanence of an object hidden from view. But despite this new awareness, these children still have difficulty following more than one displacement of an object. While playing a hiding game with his son, Laurent, Piaget hid his watch repeatedly behind one of two cushions, and Laurent consistently searched for the watch under the correct cushion. However, as Laurent watched, Piaget then placed the watch in a box, put the box behind a cushion, and then secretly removed the watch from the box and put the watch behind the cushion. He then handed the box to Laurent, who opened it and found it empty. Laurent did not search for the watch behind the cushion. Although the type of hiding problem

This 11-month-old is a little ahead of schedule, for she's already beginning to experiment with dropping things to see what happens to them, illustrating the substage of tertiary circular reactions. From this height, her toy probably did nothing too startling, but it may have moved in interesting ways.

(a)   (b)

described in the A-not-B error no longer puzzled Laurent, understanding this type of hiding, called *invisible displacement*, was not within his grasp.

Substage 6: Inventing New Means by Mental Combination (18 to 24 Months)

It is not until the sixth and last substage of **inventing new means by mental combination** that the beginnings of **symbolic thought** appear. Children begin to think symbolically and engage in internal, or mental, problem solving. The child can now invent ways to attain a goal by *mentally* combining schemas; he is no longer limited to physically exploring, manipulating, and acting on objects. Symbolic capabilities are evident in the child's emerging ability to use language and in **deferred imitation** in which the child mimics an action some time after observing it.

Finally, at this last substage, children fully acquire the concept of object permanence. They are able to make inferences about the positions of unseen objects even when the objects have been hidden or displaced several times.

NEW RESEARCH DIRECTIONS AND EXPLANATIONS OF KNOWLEDGE IN INFANCY

Piaget's ideas about the development of knowledge in infancy, including the object concept, have met with controversy. In all the tasks he used to study the development of the object concept, Piaget measured only the child's manual search behavior. Many investigators have argued that because of developmental limitations, such as poor hand-eye coordination, some children who have acquired the object concept may be unable to reveal it in manual search activities.

To study this possibility, Renée Baillargeon (1986, 1993) designed a task that allowed her to measure the amount of time infants look at a situation involving objects, which she referred to as an event, to try to reveal information about infants' understanding of objects before they are capable of manually searching for objects. Baillargeon presented 6- and 8-month-old infants with what seemed to be an impossible event: One solid object appeared to move through the space occupied by another solid object. The infant sat in front of a platform on which there was an inclined ramp (see Figure 8-1a). At the bottom of the ramp, directly in front of the infant, was a small screen that could be raised and lowered. After the screen had been lowered, a small car rolled down the ramp along a track, disappearing behind the screen and reappearing at the other side of the screen. This event was repeated until the infant became habituated to it and stopped looking at the display.

Next the infant saw one of two test events (Figures 8-1b and 8-1c). Both of these events were identical to the habituation event except that when the screen was raised, the infant saw a box placed behind it and then hidden by the lowered screen. The two test events differed by the placement of the box. In the possible event (Figure 8-1b), the box was placed behind the track and therefore out of the car's path. In the impossible event (Figure 8-1c), the box was placed on top of the track, directly in the car's path. This time when the car disappeared behind the screen and then reappeared, it looked like it rolled right through the box! (During the impossible event, the box was actually removed through a door in the back of the stage.)

What did Baillargeon find? Infants looked longer at the impossible event than at the possible event. And in later studies using the same basic experimental procedure, Baillargeon and her colleagues (see Baillargeon & Wang, 2002) found that even infants as young as 3.5 months of age could demonstrate an awareness of object permanence under these conditions. These findings suggest that infants know a great deal more about objects than Piaget thought they did.

Object permanence may not be the only principle of the physical world that children understand earlier than Piaget thought. There may be some other understandings about the world so fundamental to cognitive development that

inventing new means by mental combination Children begin to combine schemas mentally and rely less on physical trial and error.

symbolic thought The use of mental images and concepts to represent people, objects, and events.

deferred imitation Mimicry of an action some time after having observed it; requires that the child have some sort of mental representation of the action.

According to the Piagetian view of object permanence, this 10-month-old child is pretty much on track, searching for an object that was completely concealed. Renée Baillargeon has demonstrated, however, that even 3.5-month old infants may be aware that objects exist whether or not they are visible.
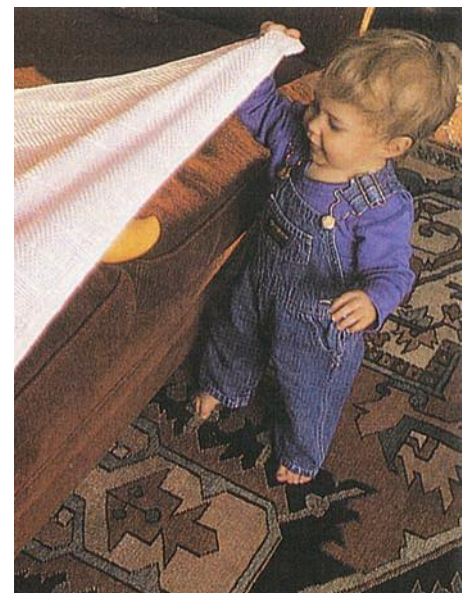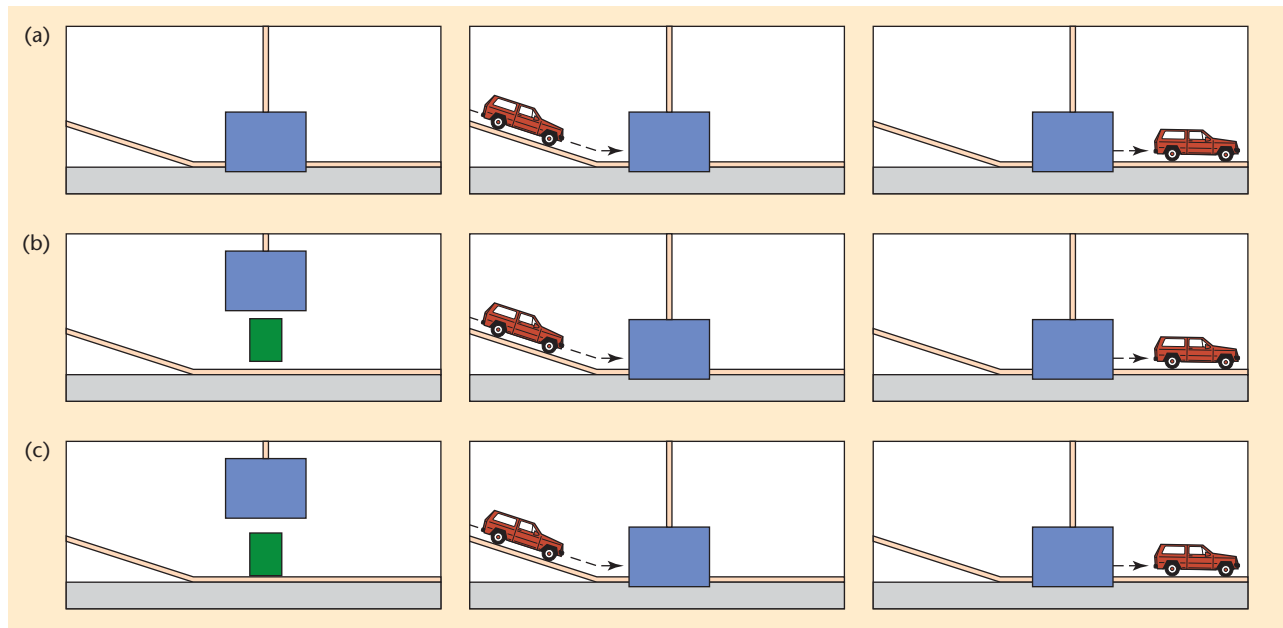
Figure 8-1

Testing infants' grasp of object permanence

As 6- to 8-month-old babies watched, a car rolled down a ramp, disappeared behind a screen, and reappeared at the other side (a). After infants saw a box placed *behind* the ramp, the car again rolled down the ramp, disappearing and reappearing once again (b; a possible event). After infants saw the box placed *on* the ramp, where it would obstruct the car's passage, the car once again rolled down the ramp, disappearing and reappearing as before (c; an impossible event). Babies looked longer at the event in (c) than at the event in (b).

Source: Adapted from Baillargeon, 1986.

core knowledge systems
Ways of reasoning about ecologically important objects and events, such as the solidity and continuity of objects.

these, too, appear very early in life. Developmental psychologists refer to these types of understanding as **core knowledge systems** (Spelke, 2000), and examples include some understanding of physical laws, such as the solidity of objects and what can happen to objects, or *event knowledge* (Baillargeon & Wang, 2002).

Research on early event knowledge has relied primarily on the *violation-of-expectation* method described in Chapter 4. For example, Hespos and Baillargeon (2001) studied the behavior of 4.5-month-old infants when they were shown two types of events, one possible and one impossible, regarding the occlusion and the containment of objects (Figure 8-2). In this experiment, the infants watched as an object, a tall cylinder, was either lowered behind a screen (the occlusion condition) or lowered inside a container (the containment condition). The investigators studied two types of events, the possible or expected event and the impossible or unexpected event. In the expected events, the objects used to occlude or contain the cylinder were as tall as the cylinder and therefore physically able to hide the cylinder from view. In the unexpected events, the objects used to occlude or contain the cylinder were shorter than the cylinder; in fact, they were only half as tall as the cylinder. In the unexpected events, the cylinder was, nonetheless, hidden entirely from view in the two hiding conditions (a trap door was used to make this impossible event work). What did the infants do? They looked longer at the unexpected than at the expected events when they were in the occlusion condition but not in the containment condition. In a similar study that included older infants, 7.5-month-old infants, but not 5.5- or 6.5-month-old infants, looked longer at both the unexpected occlusion and containment events (Baillargeon, 2002). These findings suggest that this type of event knowledge develops very early, though it appears gradually over the first year of life.
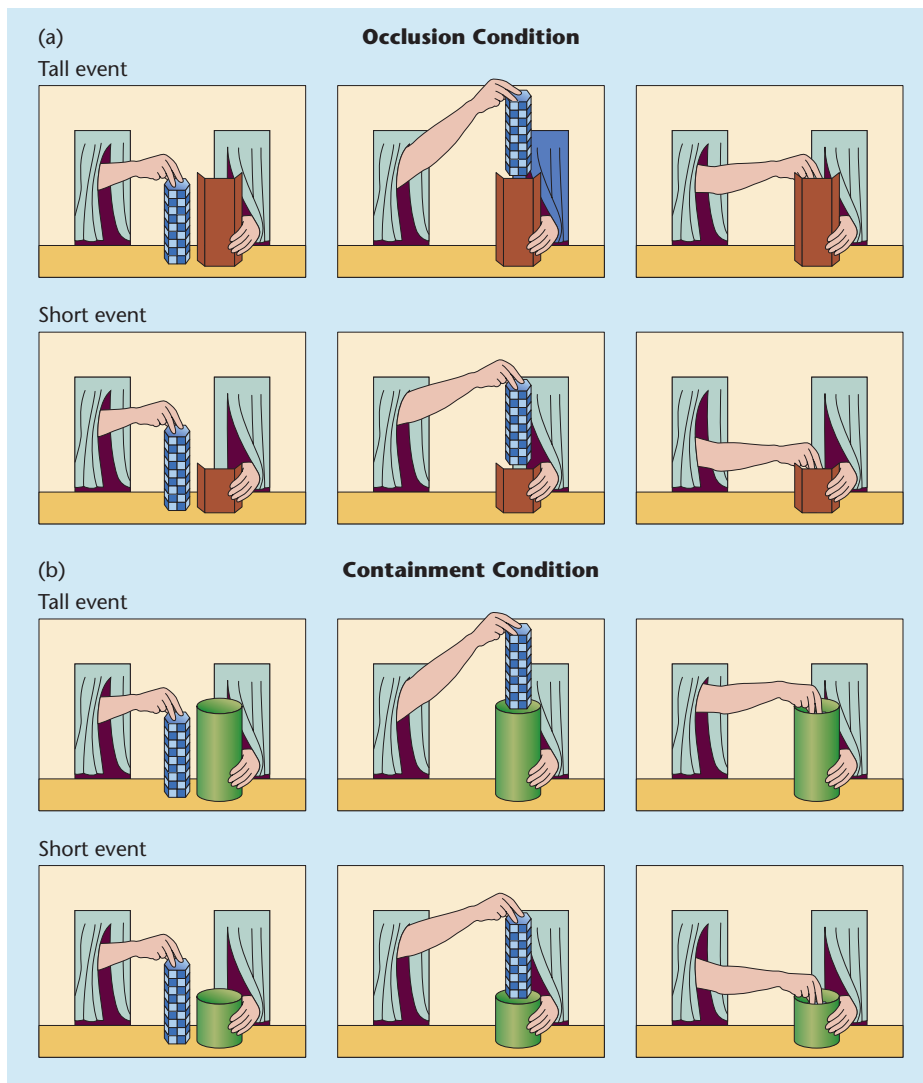
Figure 8-2

Exploring infants' knowledge of events

Drawings representing the unexpected test events for the occlusion condition (a) and the containment condition (b). Babies as young as 4.5 months looked longer at the unexpected test event in the occlusion condition, but it was not until babies were 7.5 months old that they looked longer at the unexpected test event in the containment condition.

Sources: Adapted from Baillargeon & Wang, 2002; Hespos & Baillargeon, 2001.

Studies such as this suggest that infants know more about the world than Piaget proposed. They also indicate that such early achievements develop over time. Infants may learn general principles quite early but be unable for some time to grasp the subtleties of these principles. This argument proposes that infants are biologically prepared to learn certain kinds of information or principles about the world (Gelman & Williams, 1998). This does not necessarily imply that the baby's understanding is innate but rather that human infants are predisposed to learn some critical features of their environment quite rapidly.

However, it is important to add that other researchers have raised important criticisms of studies that examine early understanding in infancy. Some have argued that longer looking time indicates that the infant can discriminate between two events, but it does not tell us why the infant looks longer at some information than at others (Haith & Benson, 1998). Other psychologists have argued that perceptual processes rather than conceptual processes explain an infant's longer looking at an impossible event (Bogartz et al., 2000; Cashon & Cohen, 2000; Rivera et al., 1999).

Finally, other psychologists have discovered that the knowledge identified in infants on tasks such as those just described is not clearly evident in children between 2 and 3 years of age (Keen, 2003). For instance, in one study, toddlers were asked to find a ball after it rolled down a ramp and stopped behind a screen (Berthier et al., 2000), as

Figure 8-3

Finding objects that have moved into a hidden space

When a ball rolled down a ramp and into one of the spaces behind the screen with the small doors, children had to open the door behind which they thought they'd find the ball. The movable barrier that protruded above the screen, and that stopped the ball's rolling, gave them a clue as to which door led to the ball.

Source: Berthier et al., 2000.

depicted in Figure 8-3. The ball could be stopped at any one of several locations behind the screen by a movable barrier that protruded above the screen and therefore served as a cue as to where the ball had stopped. To find the ball, the child opened one of the small doors in the screen. Children under 3 years of age were unsuccessful at finding the ball. Moreover, changes to the display, such as making the small doors transparent, did not help 2-year-olds perform any better on this task (Butler et al., 2002). However, 2.5-year-olds performed better with the transparent doors than they had with the opaque doors.

In examining the results from these studies, Keen (2003) points out that to solve some of these problems, children need more than object knowledge; they also need to know how to solve problems related to objects, such as searching for objects when they are moved. Searching for objects requires that the child be able to create a plan that coordinates her own actions with her predictions about how the object will move. Exactly what young children understand about objects at different ages is a question for future research.

It is clear that the account of infant cognition outlined in Piaget's six sensorimotor substages cannot explain many of the recent findings on early infant capabilities. Although Piaget did not capture the entirety of the young infant's cognitive capacities, he provided the first detailed description of cognitive development in the first 2 years of life. Moreover, cross-cultural research on the sensorimotor stage supports his general framework. Longitudinal research conducted with Baoulé children between 6 and 30 months of age in Côte d'Ivoire revealed the same six substages Piaget described (Dasen et al., 1978).

The Preoperational Stage

preoperational stage In this stage, the ability to use symbols facilitates the learning of language; this stage is also marked by semilogical reasoning, egocentricity—in which the child sees the world from her own point of view—and intuitive behavior, in which the child can solve problems using mental operations but cannot explain how she did so.

symbolic function The ability to use symbols, such as images, words, and gestures, to represent objects and events in the world.

preconceptual substage The first substage of Piaget's preoperational period, during which the child's thought is characterized by the emergence of *symbolic function*, the rapid development of language, animistic thinking, and egocentricity.

animistic thinking The attribution of life to inanimate objects.

The major characteristic of the **preoperational stage** is the child's development of the **symbolic function**, or the ability to use symbols, such as words, images, and gestures, to represent objects and events mentally. This ability to represent experience symbolically changes over the two substages of this stage, called the preconceptual and intuitive substages.

The Preconceptual Substage (2 to 4 Years)   In the **preconceptual substage**, the emergence of symbolic capabilities is evident in children's rapid development of language, their great interest in imaginative play, and their increasing use of deferred imitation. Other important characteristics of children's thinking during this substage are animistic thinking and egocentricity.

The child who demonstrates **animistic thinking** tends to attribute life to inanimate objects. For example, the child may believe that plants feel pain when he picks their flowers or that the wind talks to his friends, the trees. Researchers have questioned

Piaget's hypothesis regarding animistic thought, however. For example, Bullock (1985) and others have pointed out that the objects Piaget used to test the limits of children's animistic thought, such as the sun, the moon, and the wind, are often open to magical interpretations. In contrast to Piaget's observations, Massey and Gelman (1988) found that when they used simple and familiar objects, children as young as 4 were quite good at deciding whether animate objects, such as mammals, or inanimate objects, such as statues, could move on their own.

Piaget also claimed that children in the preconceptual substage tend to view the world from their own perspective and to have difficulty seeing things from another person's point of view. Piaget called this type of reasoning **egocentrism**. For instance, notice in the previous example that the wind is described as talking to the child's friends.

To test the child's ability to see things from another person's perspective, Piaget designed what is known as the three-mountains test (see Figure 8-4). Models of three mountains of varying sizes are placed on a square table, and chairs are placed at all four sides of the table. The child is seated in one chair, and the experimenter places a doll in each of the other three chairs, one at a time, and each time asks the child to describe what the doll sees from the three different positions. The child may select one of a set of drawings or use cardboard cutouts of the mountains to construct the doll's views. Piaget found that preoperational children could not consistently identify the doll's view from each of the three locations. In fact, on this task, Piaget found that children were not successful until later in the stage of concrete operations, when they were 9 or 10 years old.

Piaget's three-mountains task and his interpretations of when children develop perspective-taking skills have been challenged by many researchers on several grounds.

egocentrism The tendency to view the world from one's own perspective and to have difficulty seeing things from another's viewpoint.
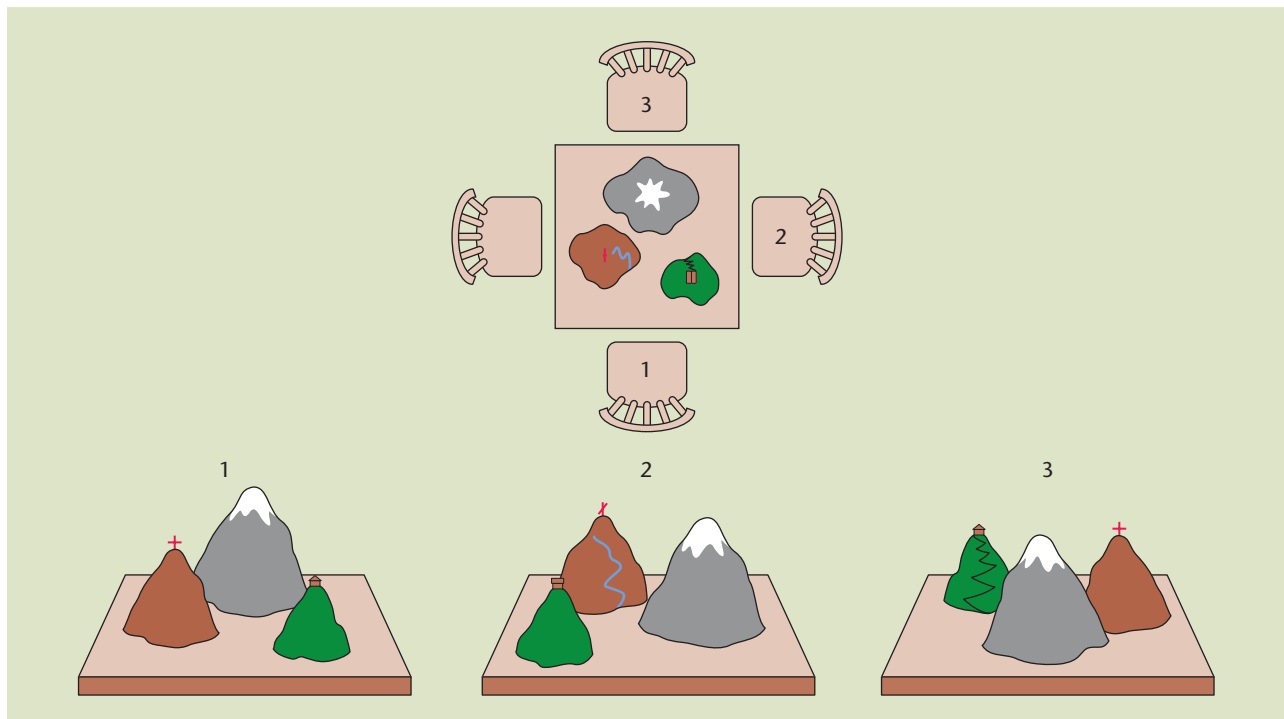
Figure 8-4

Understanding different perspectives: Piaget's three-mountain test

We show Piaget's classic test, which used a tabletop model to represent three mountains. As the text discusses, contemporary researchers have found that young children can understand the perspectives of others, represented by dolls or imaginary people, better under a number of conditions: when the mountains look more realistic, when the children are allowed to rotate small models of the mountains, and when the reason for taking another's perspective is made more meaningful or sensible to children.

First, in his original test, he used simple models of mountains that lacked clear features that could be used to differentiate one view from the next. Second, reconstructing the display or choosing the appropriate drawings may be beyond the ability of a young child. And third, choosing the correct perspective may simply not be an activity that makes sense to young children. Making two simple changes in Piaget's design, Borke (1975) obtained very different results: (a) The investigator placed familiar things, such as snowcaps, trees, or houses, on the sides of the mountains to make them more distinctive, and (b) he asked children to rotate a small model of the display to present the appropriate view rather than reconstruct the display or choose from drawings. Children as young as 3 were then able to identify the correct perspective from each of the three different positions. Hughes (1975, cited in Donaldson, 1978) tackled another aspect of this task by making the purpose of the task more understandable to the children. Rather than having three mountains, he sat the children at a table on which there were two "walls" that intersected in the middle. Thus, there were four areas or corners of the table, each set off from each other by these walls (see Figure 8-5). Hughes then introduced two dolls, a boy doll and a policeman doll, and asked the child a series of questions about where the boy doll could hide so that the policeman could not find him. Most of the children between 3.5 and 5 years of age were able to provide correct answers to the questions. These results suggest that when the task is made more comprehensible to children, they are able to perform much better than Piaget claimed.

The Intuitive Substage (4 to 7 Years)   Piaget called the second substage of the preoperational stage "intuitive" because, although the child can employ certain mental operations, such as ways of classifying or relating objects, she does not seem to be aware of the underlying principles used in performing these operations. In other words, the child in the **intuitive substage** can solve problems with these mental operations but cannot explain why she solved them in a particular way. In this substage, the child has difficulty understanding part-whole relations, as illustrated in class-inclusion problems, such as the following: A child is given 7 toy dogs and 3 toy cats, a total of 10 animals. If the child is asked whether there are more dogs or more cats, he can answer correctly that there are more dogs. However, if the child is then asked if there are more dogs than there are animals, the child responds that there are more dogs. Piaget proposed that the child is responding incorrectly because he is unable to focus simultaneously on a part of the set of animals (the subset of dogs) and on the whole set of animals.

intuitive substage The second substage of the pre-operational stage during which the child begins to solve problems by using mental operations but cannot explain how she arrives at the solutions.
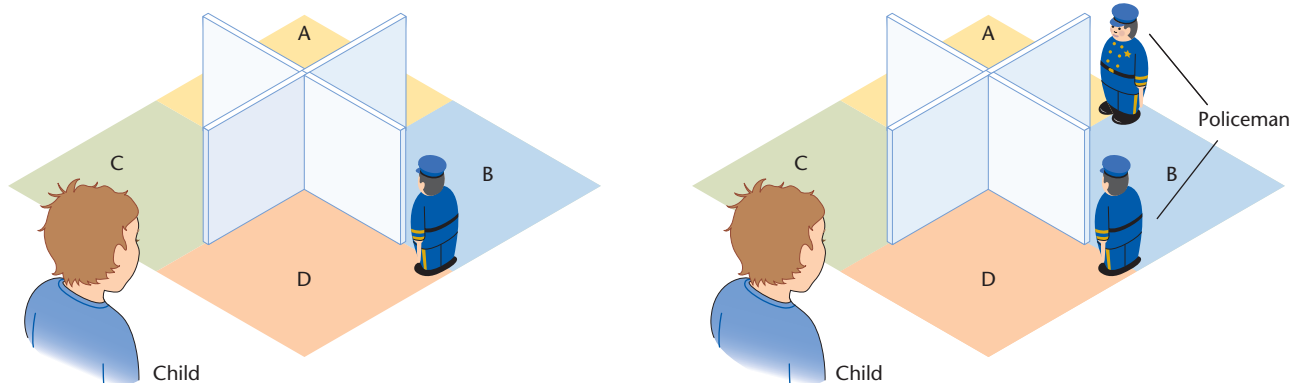
Figure 8-5

Another way to study children's perspective-taking abilities

In this model, Hughes devised four small rooms (A, B, C, and D) from among which a boy doll could choose a hiding place where the policeman doll, from various positions around the model, could not find him. Most children between 3.5 and 5 years of age were able to provide correct answers to questions about this scenario.

Source: Donaldson, 1978.

Developmentalists have criticized Piaget's research on part-whole relations, suggesting that the way he posed his questions confused young children. When Smith (1979) used simpler questions that still addressed children's ability to use part-whole relations, such as, "A pug is a kind of dog, but it's not a shepherd. Is a pug an animal?" she found that children as young as 4 displayed knowledge of the part-whole relation between dogs and animals by correctly answering that a pug is an animal.

THE MAIN LIMITATIONS OF PREOPERATIONAL THOUGHT

The main limitation in preoperational thinking is that the child is semilogical. We see one of the most vivid examples of semilogical thinking when preoperational children perform conservation tasks. To understand **conservation**, the child must recognize that even when an object's appearance is altered in some way, the object's basic attributes or properties remain the same. For example, we present the child with two identical glasses, each of which contains the same amount of liquid. The liquid in these glasses is then poured into two other glasses of different sizes, such that one glass is tall and thin and the other glass is short and wide. The result of the pouring is that although the liquid remains the same quantity—nothing has spilled or been taken away—the water levels in the tall and short glasses are now different.

Two basic attributes of a physical object, in this case, the liquid, are at issue here. One attribute pertains to the identity of the object, which is a qualitative property. To probe a child's understanding of identity in this example, we can ask her: Is the water in the different-shaped glasses the same water that was in the two original glasses of the same shape? Preoperational children have no difficulty with this question and therefore understand *object identity*, a qualitative attribute of objects. The second attribute of a physical object that can be assessed is the quantity of the object—in this case, whether the amount of the liquid before and after the pouring is the same. Preoperational children have great difficulty with object quantity questions and respond that the amounts of liquid in each of the two different-shaped glasses, though previously the same, are now different. Thus, these children can conserve the identity or quality but not the amount or quantity of objects; they are semilogical.

This semilogical pattern of reasoning among preoperational children has been demonstrated on a wide range of conservation tasks, such as those involving liquid, mass, volume, and area (see Figure 8-6). What processes of reasoning may lead the child to make this error in judgment? Piaget proposed that preoperational children's semilogical reasoning is explained by three characteristics: the inability to understand reversibility, the tendency to focus on the end state of an action, and centration, which is closely related to egocentrism.

The child's inability to understand **reversibility** means that the child cannot mentally reverse or undo an action. For example, preoperational children presented with the liquid-conservation task that we have outlined do not understand that if the water in the tall, thin glass is poured back into the short, wide glass it will reach the same height it had before. This *inability to reverse a series of mental steps* is evident in many other responses of the child between 2 and 6 years old. For example, an investigator asks a 4-year-old boy,

"Have you a brother?"

The child replies, "Yes."

"What's his name?"

conservation The understanding that altering an object's or a substance's appearance does not change its basic attributes or properties.

reversibility The understanding that the steps of a procedure or operation can be reversed and that the original state of the object or event can be obtained.

This child's decision as to whether the two glasses hold equal amounts of colored water will reveal whether he's attained an understanding of the conservation of liquid.
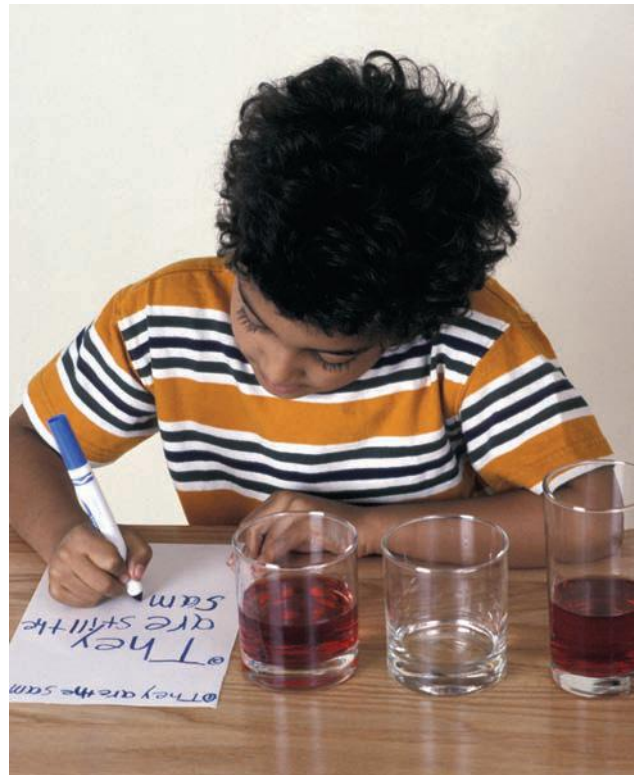
1. Number

Experimenter shows child two rows of plastic chips. Child agrees there are the same number of chips in each row.

Experimenter increases length of one row by adding space between chips (or by squeezing other row) and asks child whether each row still has the same number of chips.

2. Mass, or substance

Experimenter presents child with two identical balls of clay or plasticene. Child agrees that each has the same amount of clay.

Experimenter rolls one ball into breadstick or sausage form and asks child whether the two objects still have the same amount of clay.

3. Length

Experimenter places two sticks of equal length before child, who agrees they are of the same length.

Experimenter moves one of the sticks to the right and asks child whether sticks are still of the same length.

4. Liquids
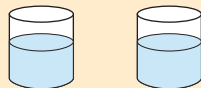
Experimenter fills two glasses of the same size and shape to the same level with water. Child agrees each glass has the same amount of water.
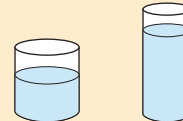
Experimenter pours the water in one of the glasses into a taller, thinner glass and asks child if each glass with water in it now contains the same amount of water.

5. Area

Experimenter shows child two sheets of cardboard, on each of which square blocks are placed in identical positions. Child agrees that each sheet has the same amount of open (uncovered) area.

Experimenter then scatters the blocks about one of the cardboard sheets and asks child whether the two sheets now have the same amount of open area.

6. Weight
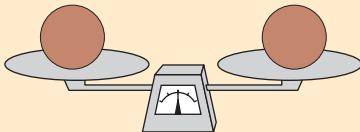
Experimenter places two balls of clay of the same size on a scale and asks the child if they weigh the same.
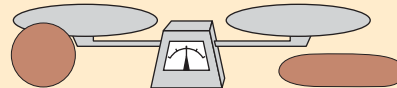
Experimenter then reshapes one ball and, before replacing it on the scale, asks the child if the two pieces of clay still weigh the same or if one weighs more.

7. Volume
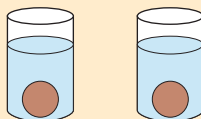
Experimenter drops each of two balls of clay of the same size into two glasses of water; the child has already agreed that the glasses have the same amount of water.
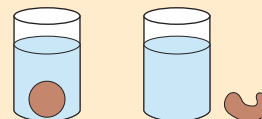
Experimenter removes one piece of clay, reshapes it, and, before putting it back into the glass, asks the child if the water level will be higher or lower than or the same as the water level in the other glass.

Figure 8-6   Some Piagetian tests of conservation

These tests are discussed at further length in the text.

Source: Based on Lefrancois, 1973.

"Jim."

"Does Jim have a brother?"

"No." (Phillips, 1969, p. 61)

The preoperational thinker also tends to have an **ends over means focus**; that is, the child focuses on the end states rather than the means by which the end states were obtained. As a result, he tends to overlook the process or transformation by which the change occurs. Again, in the liquid-conservation task, the preoperational child ignores both the experimenter's action of pouring the water from one glass to the other and the rising water level in the glass. Instead, the child focuses on the end state of the process—that is, the high water level in the tall container that now appears different from the water level in the short container.

Finally, **centration** in thinking leads preoperational children to center or focus their attention on only one dimension of an object or situation. In our test example, children tend to base their reasons for why they think the amount of water in the containers is no longer equal on the heights of the water in the glasses. This tendency prevents the child from grasping the notion of conservation, which involves several changes simultaneously.

Cross-cultural studies have found considerable variation in the age at which children acquire the concept of conservation and variation in the ages at which they acquire this concept with respect to various substances (Mishra, 1997; Rogoff, 2003). In Western societies, in general, children achieve conservation of liquids, mass, and length sometime between the ages of 6 and 7; they can conserve number a little earlier—by about age 6. Understanding conservation of weight, area, and volume takes somewhat longer, emerging, respectively, at about age 9, between 9 and 10, and after age 11. Cultural variation in the onset of these particular conservation abilities has been linked to the experiences children have with these particular abilities in different communities (Dasen, 1975; Gardiner & Kosmitzki, 2008). For example, children who grow up in communities in Mexico where adults make clay pots for a living develop conservation of mass earlier than children who do not grow up in these communities (Price-Williams et al., 1969). Such patterns raise interesting questions about the connection between cultural practices and the development of cognitive skills (Goodnow et al., 1995).

The Stage of Concrete Operations

The **concrete operations stage** extends from about the age of 7 to the age of 11 or 12. At this time, children understand reversibility and are able to attend to more than one dimension of a problem at a time. They are able to conserve quantity and to classify or group things in a logical way. However, their thinking at this point is tied to concrete reality; that is, they can solve problems only if the objects necessary for problem solution are physically present. For example, suppose we present a child with three children of varying heights in differently composed pairs. In pair 1, the child sees that Melissa is taller than Zoe, and in pair 2, she sees that Zoe is taller than Fabiana. Without seeing Melissa and Fabiana together, the child can reason that Melissa is taller than both Zoe and Fabiana. If, however, instead of presenting the three girls physically, we present the problem verbally, as "Melissa is taller than Zoe and Zoe is taller than Fabiana; who is the tallest of the three?" the concrete operational child will have difficulty solving the problem based on verbal information alone.

Children also make advances in the ability to classify or sort objects according to combinations of several attributes. For example, the child can sort a group of flowers into a major class (types of flowers) and a subclass (flower colors within these types): yellow roses, yellow tulips, yellow daisies, red roses, red tulips, and red daisies (Fischer & Roberts, 1986).

Again, developmentalists have questioned whether the solution of such problems is based on the underlying changes in mental operations that Piaget proposed. Some

ends over means focus Consideration of only the end state of a problem in evaluating an event; failure to consider the means by which that end state was obtained.

centration Focusing one's attention on only one dimension or characteristic of an object or situation.

concrete operations stage Stage in which the child is able to reason logically about materials that are physically present.

investigators have suggested that in tests of inference, such as judging the relative length of several sticks based only on a verbal statement, what poses difficulty for the concrete operational child is not the lack of physical stimuli but the lack of memory capacity. To test this idea, Bryant and Trabasso (1971) showed that when the memory demands of a task are limited, concrete operational children can make logical inferences without having the physical materials present.

Although Piaget thought that the ability to classify develops during the preoperational and concrete operational periods, we now have evidence that even infants can place objects into categories (Oakes & Madole, 2003). Researchers have shown that babies as young as 3 to 4 months old can form categories of animals, such as a category with dogs and cats but not with birds (Cohen & Cashon, 2006; Haith & Benson, 1998; Quinn & Eimas, 1998). In addition, they are able to categorize animals and vehicles based on perceptual similarities and also based on different types of motion—for example, the motion of a dog versus the motion of a car (Arterberry & Bornstein, 2001; Rakison, 2007). Apparently, children can classify objects at a much earlier age and in a more sophisticated fashion than Piaget believed possible.

Researchers who have undertaken cross-cultural studies of Piagetian concepts associated with concrete operations have demonstrated the importance of culture in determining what concepts will be learned and when. This research indicates that cognitive competence is intricately related to the cultural context in which development occurs (Cole, 2006; Rogoff, 2003; Shweder et al., 2006). If we define intelligence as adaptation to the environment, as did Piaget, it is not surprising that cognitive development differs in some ways in cultures with different environments, expectations, and needs. Some cultures emphasize the need to learn certain kinds of concepts while other cultures stress other kinds. Even when cultures emphasize similar concepts, the timing of this emphasis—in terms of when opportunities are provided for children that support the development of these skills—may vary.

Pierre Dasen (1984) has examined these ideas by comparing the performance of children of two very different cultures on tasks of the conservation of liquids and of horizontality (the latter requires the child to understand that when a vessel containing a liquid is tilted at various angles, the surface plane of the water will always be horizontal). Dasen found interesting differences on these tasks across the two groups. Whereas 90% of Inuit children, of Cape Dorset (in Canada's Nunavut Territory above Hudson Bay), understood horizontality by the age of 8 (100% by age 12), only 60% grasped the conservation of liquids even by the age of 15 (see Figure 8-7a). In contrast, only 50% of Baoulé children, of Côte d'Ivoire, understood horizontality by age 15, but 100% had an understanding of the conservation of liquids by the age of 10 (Figure 8-7b). Commenting on these results, Dasen suggests that people develop "those skills and concepts that are useful in the daily activities required" in their ecocultural settings. The Inuit, who are nomadic hunter-gatherers, value spatial skills and, as a result, acquire ideas like horizontality quite quickly, but they have less experience with quantitative comparisons. The Baoulé, on the other hand, are an agricultural people who, because they produce food, store it, and exchange it in the markets, have considerable experience with quantitative concepts, especially those concepts involved in measurement.

As these results suggest, culture alters the cognitive experiences children have and the *rate* at which children learn certain types of knowledge, including the concepts Piaget described in relation to the stage of concrete operations.

The Stage of Formal Operations

formal operations stage Stage in which the child becomes capable of abstract thinking, complex reasoning, and hypothesis testing.

How do thought processes in the **formal operations stage**, which begins at age 11 or 12, differ from those typical of the concrete operations stage? Perhaps the most significant changes are in the flexibility and complexity of the thought process, the use of mental hypothesis testing, and the ability to entertain many possible alternatives when solving problems (Kuhn & Franklin, 2006).
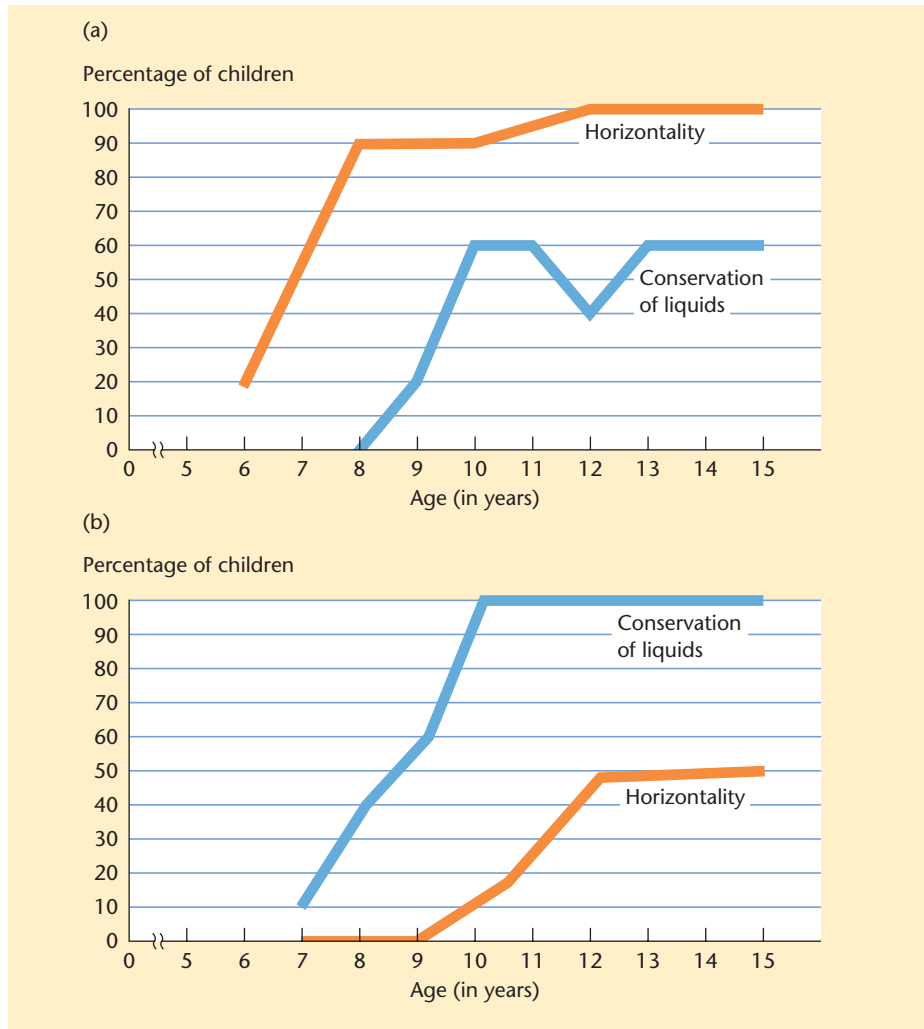
Figure 8-7

Conservation among Inuit and Baoulé children

Achievement of the concepts of horizontality and the conservation of liquids between the ages of 6 and 15 among (a) Inuit children of the Canadian Northwest Territories and (b) Baoulé children of Côte d'Ivoire.

One particularly interesting change is the ability to think abstractly and understand and even solve problems that have no basis in reality. For example, consider the problem, "If all blue people live in red houses, are all people who live in red houses blue?" The concrete operational child would have difficulty getting beyond the fact that there is no such thing as blue people. In contrast, the child, or more accurately, the young adolescent, in the stage of formal operations can move beyond the unrealistic content to focus on applying logical solutions to the question posed. Consequently, in the stage of formal operations, the thinker's understanding and examination of the world are not confined to reality. Rather, the young adolescent is able to think of and contrast both real and ideal states of the world. They can consider different ways of arranging the world; for instance, they can think about and discuss philosophical issues such as truth and justice, and they can imagine alternative lifestyles and universes. Not surprisingly, this is the stage when science fiction becomes of interest.

Children in this stage are also able to review several possible alternatives or hypotheses in a problem-solving situation. Inhelder and Piaget (1958) used a task involving a problem in physics to illustrate the differences in problem solving in the stages of concrete and formal operations. In this task, participants are shown an assortment of objects and a container of water and asked to use these materials to find an explanation for why some objects float and others do not. What the children are actually being asked is to derive Archimedes' law of floating bodies, which states that an object will float if its weight per unit (or density) is less than that of water. Thus, if two objects are of equal weight, the larger object is more likely to float than the smaller object. Concrete

operational children may focus on weight or size as a reason things float or sink; for instance, they may say that the heavier or bigger objects are more likely to sink. They may even arrive at a double classification that involves the categories large and heavy, large and light, small and heavy, or small and light. However, they are still unable to consider alternatives not directly observable in the physical world. For example, they cannot predict that a large and heavy piece of wood will float even though it is bigger and heavier than a small lead weight.

In contrast, in the formal operations stage, the child can free herself from the obvious cues of weight and size and conceptualize a variety of possible alternatives to arrive at the concept of density. Piaget describes the comments of a child who has just entered the period of formal operations grappling with this kind of problem: "It sinks because it is small, it isn't stretched enough. You would have to have something larger to stay at the surface, something of the same weight and which would have a greater extension" (Inhelder & Piaget, 1958, p. 38).

Developmentalists continue to debate Piaget's notions about cognitive development in this last stage and to search for the best ways to describe the child's thinking at this time (Keating, 1990; Kuhn & Franklin, 2006; Overton & Byrnes, 1991). Actually, not all adolescents or, for that matter, all adults in all societies reach the stage of formal operations and achieve the flexibility in problem solving that Piaget associated with this period (Kuhn & Franklin, 2006). Unlike concrete operational thought, which seems to be acquired to some degree in all societies, the attainment of formal operations is strongly influenced by culture (Bond, 1998; Rogoff, 2003). In cultures that do not emphasize symbolic skills or in which educational experiences are limited, the stage of formal operations may occur late in development or may even be absent (Moshman, 1998). Even in Western communities in which symbolic skills and educational attainment are highly valued and available, adolescents and adults are more likely to achieve the capacity for logical abstract reasoning within their particular areas of interest or expertise than in other domains. For instance, abstract thinking has been documented in traditional cultures in tasks of much importance to the group, such as court cases related to land disputes and navigating on the open seas (Gladwin, 1970; Hutchins, 1980). Thomas Gladwin found that seafarers in traditional communities in Micronesia use star charts and other complex techniques to construct elaborate and sophisticated routes that enable them to transverse the ocean and even cross the equator. In addition, scientific training in such subjects as physics, chemistry, and the philosophy of logic has been found to be associated with greater ability to use formal operations (Kuhn & Franklin, 2006). Thus, formal operational thinking is strongly tied to social and cultural experiences.

PIAGETIAN CONCEPTS AND SOCIAL COGNITION

Although Piaget concentrated on the individual's cognitive development, a number of his ideas have stimulated research on the development of social cognition. His concept of object permanence, for example, has relevance for the development of self-recognition—conceiving of the self as separate from the environment and other people—and the development of attachment, or a deep emotional connection to another person. Piaget's views on egocentrism and perspective taking also have implications for the development of social cognition. Because understanding of the self and others has tremendous consequences for children's development, we discuss it here.

The Self as Distinct From Others

A central component in the development of social cognition is differentiation of the self from the environment, including other human beings (Harter, 2006). The beginning of this differentiation is evident in early infancy when babies expect people and objects

to behave differently. In fact, even young babies seem to expect certain behaviors from people. For example, if you face a 2-month-old baby without moving or speaking, the infant will become distressed (Adamson & Frick, 2003).

With development, the child's view of herself becomes more differentiated. As we saw in Chapter 6, very young infants will gaze at their reflections in a mirror, but it is not until the second year of life that children recognize their own images in a mirror. Recall that Piaget said that children achieve a full understanding of object permanence some time between the ages of 1.5 and 2 years, about the same time that they first see their mirror images as themselves. An understanding of object permanence may be a prerequisite for self-recognition.

Also, with development, the child's view of herself includes more information about the self, such as values, motives, intentions, and other psychological experiences. Whereas preschool children (5 or younger) tend to define themselves mainly by physical attributes or favorite activities (e.g., "I'm 4 years old; I like to swim"), at around 7 or 8 (Piaget's stage of concrete operations), children begin to describe themselves in more complex terms that focus on abilities and interpersonal characteristics, such as *smart* and *nice* (Harter, 2006). The growing ability to think in the abstract allows the adolescent (from 11 or 12 on) to create a more integrated and complex view of the self and his role in society (Harter, 2006).

Role Taking: Understanding Others' Perspectives

With development, children become less egocentric and more able to understand the thoughts and perspectives of others (Yuill & Pearson, 1998). Some developmentalists argue that the shift away from an egocentric orientation underlies improved communication skills as well as the development of moral standards and prosocial behaviors (Eisenberg et al., 2006; Harter, 2006). The development of these abilities is basic to the child's socialization, and we will return to this topic in greater detail in Chapter 14.

Selman and his colleagues have linked cognitive development and social perspective taking over a series of five distinct stages (see Table 8-3) (Selman, 1980; Selman & Byrne, 1974; Selman & Jacquette, 1978). These stages begin with the child's egocentric behavior and then proceed into more complex social understanding and reasoning. As children move through these stages, they learn not only to differentiate between their own perspectives and those of others but also to understand others' views and the relations between those views and their own. Although there are normative patterns in the development of perspective taking, some children develop these abilities earlier than others (see Figure 8-8). What kinds of factors are related to these individual differences? As we discuss in Chapter 14, some studies have found positive relations between prosocial behavior, such as helping and sharing, and role-taking skills (Eisenberg, 1992; Eisenberg et al., 2006).

Theory of Mind

The area of study known as **theory of mind** focuses on when and how children come to understand the mind. This research covers topics ranging from the development of the ability to distinguish appearance from reality to children's understanding of dreams, beliefs, intentions, desires, and deception (Harris, 2006). Researchers are also interested in when and how children come to think of the self and other people as psychological beings.

A number of studies have explored when children begin to understand the thinking of other people. A task that has been used often to study this question is the *false-belief task* (Wimmer & Perner, 1983), which involves telling a child a story and then asking him what a character in the story thinks. For example, the child will be told a story

theory of mind Understanding of the mind and how it works.

Table 8-3

Role taking: Developing the ability to take different perspectives

Stage 0 Egocentric Perspective
The child does not distinguish his own perspective from that of others or recognize that another person may interpret experiences differently.
Stage 1 Differentiated Perspective
The child realizes that she and others may have either the same or a different perspective. Although she is concerned with the uniqueness of each person's cognitions, she can't judge accurately what the other person's perspective may be.
Stage 2 Reciprocal Perspective
Because the child can see himself from another's perspective and knows the other person can do the same thing, he can anticipate and consider another's thoughts and feelings.
Stage 3 Mutual Perspectives
Now the child can view her own perspective, a peer's perspective, and their shared, or mutual, perspective from the viewpoint of a third person. For example, she can think of how a parent, teacher, or other peer might view both her and her friend's perspectives as well as their mutual perspective.
Stage 4 Societal or In-Depth Perspectives
Children (and adults) can see networks of perspectives, such as the societal, Republican, or African American point of view. People understand that these varying perspectives not only exist in awareness but involve deeper, perhaps unconscious representations, such as feelings and values.

Source: Adapted from Selman & Jacquette, 1978.

about a young boy named Maxi who puts his candy in a cupboard in the kitchen and then goes into another room to play. When Maxi is off playing, his mother moves his candy from the cupboard to a drawer. After a while, Maxi returns and wants his candy. At this point, the researcher would ask the child where Maxi will look for his candy.
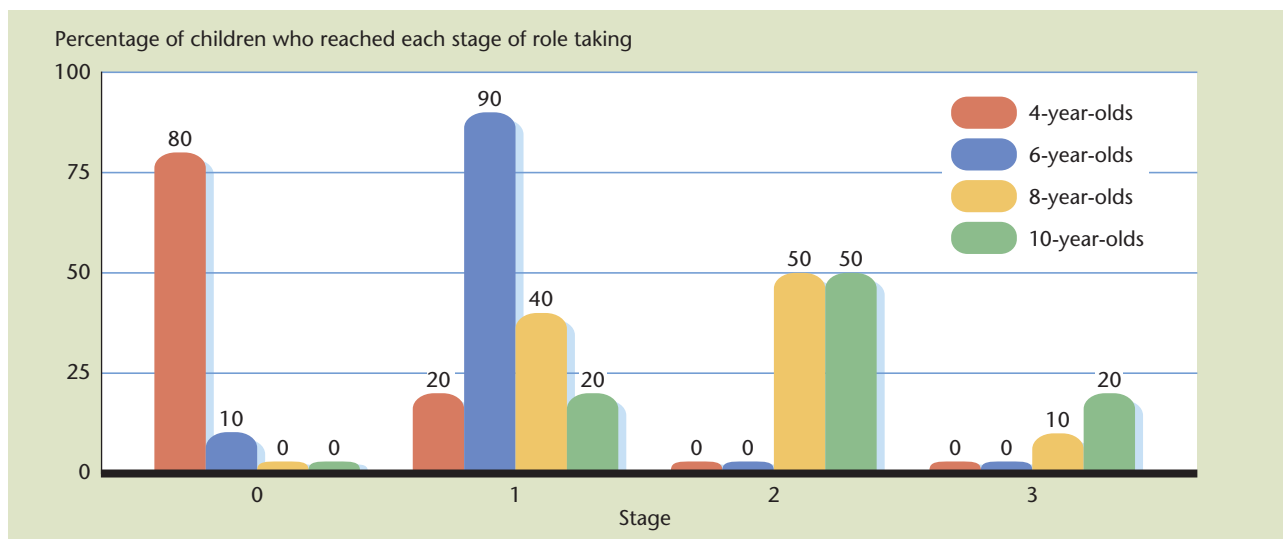
Figure 8-8

Role taking at different ages

Between the ages of 4 and 6, children shift from an egocentric perspective to a more differentiated one. From here on, progress in appreciating others' views is less dramatic but steady.

Source: Based on Selman & Byrne, 1974.

Older preschoolers, 4- to 5-year-old children, typically say that Maxi will search in the cupboard, indicating they assume that Maxi will look where he believes the candy is, not where they themselves know the candy to be. In other words, they attribute a belief, or mental state, to Maxi and use this belief as a basis for their response. To answer in this way, the child needs to hold two understandings or representations of the situation in his mind simultaneously: what the child himself knows to be true and what Maxi believes to be true. Three-year-old children respond quite differently; they say that Maxi will look for the candy in the drawer where his mother put it. In other words, the child has his own belief about where the candy is based on his knowledge, and he is unable to separate his understanding from the mental state of the child in the story. Thus, the child's answer represents his own belief about where the candy is.

Although this basic pattern of results has been replicated in a wide range of studies (Wellman et al., 2001), the findings have been contested on a number of grounds (Mitchell, 1997). For instance, some investigators have pointed out that there may be a difference between the development of a theory of mind in relation to fictional information, as in pretend play, and the development of an understanding of states of knowledge, such as false beliefs (Lillard, 1993). At present, it appears that this complex ability originates early in life, and it exists in almost all people—the main exception being children with autism (Baron-Cohen, 2000; Lillard, 2006). It seems that human beings have a special ability to identify with other human beings as mental agents with needs, desires, and intentions that guide their behavior. The potential for interacting with, and learning from, others that this capability makes possible is profound (Carpendale & Lewis, 2006; Tomasello et al., 2005).

Do Sociocultural Experiences Influence the Development of Social Cognition?

Although Piaget's theory has implications for research on the development of social cognition, Piaget's own theoretical development along these lines was limited. In addition, research that indicates that the development of social cognition may be modified by social and cultural factors challenges the links between Piaget's theory and the development of social cognition (Cole, 2006; Dasen, 1984). For instance, from early to middle childhood, children's self-constructs become increasingly aligned with the values of their cultural community, such as in terms of the roles and preferences they have. Along these lines, European American children tend to describe their memories in relation to their own feelings and experiences, and Chinese children tend to emphasize social roles and responsibilities (Wang, 2004).

Although most research on children's theory of mind has been conducted with children in Western, middle-class communities in which discussions about the mind and what people think are common, research has examined both social and cultural contributions to the development of a theory of mind. Children in Western middle-class communities are often encouraged by their parents to talk about the mind (e.g., when parents ask children what they or others are thinking about). However, some styles of parenting, a topic covered in Chapter 11, may affect this development. Vinden (2001) found lower rates of social understanding among European American children with authoritarian parents. Siblings may also play an important role in this developmental process.

Perner et al. (1994) showed that young children who have more siblings with whom they interact perform better on false-belief tasks. However, the ages of the siblings matter. Children with siblings (who are not their twin) performed better on theory of mind tasks than children who were twins and had no other siblings (Cassidy et al., 2005). The extent to which children in immigrant Latino families who informally translate for their parents in their negotiations with doctors, employers, or government officials is related to theory of mind as well (Love & Buriel, 2007). This cultural brokering experience may increase children's awareness of the mental states of others and the links between mental states and social behavior—central aspects of theory of mind.

Are changes in children's understanding of mind universal; that is, do these changes appear in all cultures? Avis and Harris (1991) conducted a study of children's reasoning about people's beliefs and desires in the Baka community, hunter-gatherers who live in central Africa. These researchers found that by 5 years of age, most of the children they studied were able to predict correctly what an adult would find in a container that they had left for a moment and that, while they were gone, had been emptied. These results are consistent with other findings that show successful performance by preschool-age children in non-Western communities on theory of mind tasks (Harris, 2006). Although variation both within and across cultures in the development of theory of mind have been shown (Lillard, 1998), the research indicates that during childhood an important set of capabilities known as theory of mind develops and that cultural experiences around the world support this process.

EVALUATION OF PIAGET'S THEORY

Piaget's theory has a valuable place in the study of cognitive development. However, like every theory, it has strengths and limitations, which we review as a prelude to our overall assessment of the theory.

Strengths of the Theory

In Chapter 1, we pointed out that theories are useful for two reasons: They integrate a wide array of information, and they lead to new research by stimulating hypotheses and defining new areas of study. Piaget's theory achieved both of these goals. With his stage model and his underlying concepts such as schemas, cognitive organization, and adaptation, Piaget integrated a broad spectrum of issues regarding concepts of the physical world—such as conservation, classification, and number—into a single theory. In addition, Piaget's theory has stimulated an enormous amount of research. According to Miller (2002), the most important ideas that Piaget introduced to the field are that the child actively seeks and constructs knowledge, that cognitive development unfolds over a series of qualitatively distinct stages, and that in the first 2 years of life, cognition is based on the child's perceptual-motor system.

Piaget was an extraordinary observer of human behavior. His observations described behaviors that continue to intrigue developmental psychologists. Why do infants behave as if objects disappear when they go out of sight? Why do preschoolers not conserve the quantities of substances when their shapes or appearances are altered? Why is it that school-age children can think logically about problems, even difficult problems, but when these problems are abstract (concrete materials are not available), they cannot use their skills at logical thought?

Limitations of the Theory

DID PIAGET JUDGE THE CHILD'S ABILITIES ACCURATELY?

As we discussed, a great deal of research has suggested that infants and children may know a lot more than Piaget thought. In other words, Piaget may have underestimated the timing or onset of children's cognitive abilities. For instance, infants seem to understand some aspects of object permanence quite early (Cohen & Cashon, 2006), and many children in the preoperational and concrete operational periods seem to be more cognitively advanced than Piaget's theory would suggest (Halford & Andrews, 2006). However, it remains an open question whether showing cognitive abilities at an earlier age than Piaget proposed represents a major challenge to his theory. After all, Piaget was less concerned with the age of onset of the abilities he studied than with their order of appearance.

DOES COGNITIVE DEVELOPMENT PROCEED IN STAGES?

According to Piaget, children's cognitive development undergoes qualitative shifts from one stage to another, and these stages are presumed to follow each other in an invariant order. Moreover, the child cannot proceed to the next stage until she has mastered the ways of thinking characteristic of the current one.

Recent evidence (Siegler & Alibali, 2005) suggests that cognitive development may not occur in the stagelike steps that Piaget proposed. However, how we describe changes in children's thinking, and whether or not they are called stages, depends in large measure on the way in which a change is studied. The focus of a study and especially the length of time between two or more measurement points are important. For example, if we evaluate a child's abilities at 6-month intervals or even years apart, changes in these abilities may seem discontinuous, as Piaget found. However, if we look closely at the changes that occur within a shorter period of time, an hour or a day or even across several weeks—let's say as a child tries to solve a particular problem—we may find that the child's progress appears more gradual and continuous.

One difficulty in knowing for sure whether cognitive development is best described as a series of stages is due to the fact that children in the concrete operational stage do not acquire the ability to conserve all types of substances at the same age. This unevenness in development, which Piaget called **horizontal décalage** (the French word *décalage* can be translated as "time lag"), is problematic for his stage theory. The idea of a stage implies that the child in a particular stage should be consistent in her thinking across similar types of problems. Piaget proposed that horizontal décalage reflects the differing degrees of abstraction required to understand the conservation of particular objects or substances. For example, he suggested that conserving mass requires the fewest abstract operations, whereas conserving volume requires the most; as a result, conservation of mass is acquired earlier.

Interestingly, findings from studies in which conservation tasks have been changed to be more accessible to children show that if we present children with simpler versions of these tasks or teach them to attend to all the relevant aspects of the task, they can often demonstrate their understanding of conservation. For instance, in the study in Mexico of the children of potters, mentioned previously, those children who initially performed poorly on conservation tasks that were conducted with materials unfamiliar to them went on to perform quite well on a test of conservation of mass when they were dealing with familiar materials, such as the clay and other substances used in making pottery (Price-Williams et al., 1969). To test the notion that failure to conserve may occur because the child attends to some irrelevant aspect of the stimulus, such as shape, length, or height, Jerome Bruner (1966) presented preoperational children with a modification of Piaget's liquid-conservation task. As the experimenters poured the water from the short glass to the tall glass, they placed a screen in front of the tall glass. When the distracting changes in the height and width of the water column were not visible to the children, most were able to conserve. In sum, if a task is simplified or made more comprehensible, children can conserve at earlier ages than Piaget suspected. This type of research suggests that Piaget's notion of stages requires further study and explanation.

HOW DOES THE SOCIOEMOTIONAL AND CULTURAL CONTEXT OF COGNITIVE DEVELOPMENT FIT WITH PIAGET'S THEORY?
Although Piaget's theory did not include social, emotional, and cultural contributions to cognitive development in any central way, research indicates that cognitive development, including Piagetian-based concepts, may be modified by cultural, social, and other experiential factors (Cole, 2006; Dasen, 1984). We discussed contributions of the social and cultural context to many aspects of Piaget's theory. Except in his theory of children's moral development (Chapter 14), Piaget also did not consider children's emotional states and emotional development in relation to cognitive development. Additionally, in spite of Piaget's pessimism about the child's ability

horizontal décalage The term Piaget used to describe unevenness in children's thinking within a particular stage; for example, in developing an understanding of conservation, children conserve different objects or substances at different ages.

to proceed more quickly through the stages as a result of instruction, the evidence is now clear that active intervention, such as training in problem-solving strategies—a specialized form of social experience—can accelerate cognitive development (Gelman & Baillargeon, 1983; Siegler & Alibali, 2005).

Despite these theoretical limitations, Piaget's ideas have relevance to both education and counseling, which may in turn affect children's social and emotional functioning. There is a long history of connections between Piaget's theory and educational practice. Piaget admired the ideas of Maria Montessori, especially her views on the close relation between thought and action (Lillard, 2005). He drew on these ideas in his theory and even conducted many of his observations of young children's thinking at a modified Montessori school in Switzerland. In addition, approaches to child counseling may be informed by Piaget's ideas. Consider how Piaget's theory could be helpful in counseling a young child who is struggling with his parents' divorce or a parent's death. Would a preoperational child be likely to interpret such situations egocentrically and perhaps blame himself for his parents' divorce? Or would a preoperational child, because of limited understanding of the distinction between what is real and what is not, be prone to wishful thinking, perhaps believing that if he just wished hard enough, his deceased parent would come back to life? Although Piaget did not deal directly with such issues, clearly an understanding of the capabilities and limitations associated with the different stages of thinking that he described could help guide an educator or therapist who works with children in need.

Overall Assessment

Despite new findings and their resulting criticisms, Piaget's theory has had an enormous impact on the study of the child's development of cognitive skills. In fact, his theory was a major force in introducing cognition into developmental research in the latter half of the twentieth century (Beilin, 1992). Although his theorizing and methods were sometimes flawed, Piaget asked and answered important questions in innovative ways, and his ideas have stimulated a vast amount of research and theorizing among other behavioral scientists. If one test of the worth of a theory is its ability to generate interesting ideas for further study, Piaget's theory, without question, passes this test with "flying colors."

VYGOTSKY'S SOCIOCULTURAL THEORY OF COGNITIVE DEVELOPMENT

The developmental theory introduced by the Russian psychologist Lev S. Vygotsky focuses on the influence of the social and cultural world on cognitive development (Vygotsky, 1978). Vygotsky's interest in the sociocultural context of cognitive development was undoubtedly informed by his own experience growing up in the early twentieth century, which was a time of tumultuous social change in Russia (Kozulin, 1990). When Vygotsky was young, Czar Nicholas ruled Russia and the social divisions within the society were clearly marked. These divisions had enormous effects on the lives of the Russian people, and Jews, like Vygotsky, were treated particularly badly. In 1917, the year Vygotsky graduated from Moscow University, the Russian Revolution began and the entire society was in upheaval. After the revolution, as Vygotsky launched his career as a psychologist and developed his theory, civil war and famine ravaged the country, and the entire social structure of the nation changed dramatically. Although some aspects of Vygotsky's life improved, others did not. At the time of his death at age 37 from tuberculosis, he had fallen into political disfavor in Stalinist Russia and his work was banned. As a result, it wasn't until the late 1970s that psychologists in the

United States and other parts of the world began to explore Vygotsky's ideas (Wertsch & Tulviste, 1992).

Vygotsky's view of cognitive development is called a sociocultural approach because it proposes that cognitive development is largely the result of children's interaction with more experienced members of their culture, such as parents, teachers, and older children. As the child and her partners solve problems together, the child has opportunities to participate in actions that extend beyond her current individual capabilities. Through these experiences, the child learns to function on her own in a more advanced intellectual way. Although Vygotsky held that each child is born with a set of innate capabilities, such as attention, perception, and memory, he believed that input from the child's social and cultural worlds, in the form of interactions with more experienced adults and peers, directs these basic capabilities toward more complex, higher order cognitive capabilities. Because this theory puts great emphasis on the role of social interaction in cognitive development, Vygotsky held that language has a particularly important role in the child's intellectual development.

Vygotsky was especially interested in the social and cultural processes that support cognitive development. He described changes in the ways that children interact with other people as well as with the psychological tools and symbol systems of a culture that can be used to support and extend cognition, which he called **mediators**. Across development, children learn to use different types of mediators—such as language, counting, mnemonic devices, algebraic symbols, art, and writing. Mediators permit the child to function more effectively in solving problems and understanding the world. For Vygotsky, what was particularly important about mediators is that they come from and thereby represent the social and cultural context of development. As the child develops competence with these mediators and comes to use them in his or her thinking, the child's thinking is increasingly aligned with the social and cultural context in which growth occurs. This enables children to act effectively in their environment and interact in understandable and meaningful ways with other people in their culture.

We begin by discussing Vygotsky's notion of mental functions. Here we see how mediators enable the child to move to new levels of psychological processing. We then examine Vygotsky's concept of the *zone of proximal development*, a concept that expands on his idea that children learn through social interaction and that has given rise to such concepts as scaffolding and guided participation. We next explore the influence of culture on children's cognitive development, learning, and use of language.

> **mediators** Psychological tools and signs—such as language, counting, mnemonic devices, algebraic symbols, art, and writing—that facilitate and direct thinking processes.

Elementary and Higher Mental Functions

In Vygotsky's theory, an important change in children's cognitive development occurs between elementary and higher mental functions. **Elementary mental functions**, such as basic attention, perception, and involuntary memory, are biological and emerge spontaneously. With development, elementary mental functions are transformed into **higher mental functions**, such as voluntary attention and intentional remembering. These functions involve the coordination of several cognitive processes. They also involve the use of mediators, such as language and other cognitive tools and symbol systems that children learn to use as they interact with other people in their culture.

Vygotsky's discussion of memory illustrates the difference between these two types of mental functions. The elementary form of memory is constructed of images and impressions of events. It is very similar to perception; it is also unintentional and the environment directly influences its content. The higher form of memory involves the use of signs to mediate memory functions; for instance, the child may write something down to help her remember it. Thus, the child uses literacy as a tool to extend basic memory processes. Mediational systems, like language and other tools that aid intelligent action, such as literacy, are products of culture (Cole, 2006). Children learn how to use these tools through the assistance of people in their culture who are more experienced than

> **elementary mental functions** Psychological functions with which the child is endowed by nature, including attention, perception, and involuntary memory, that emerge spontaneously during children's interaction with the world.

> **higher mental functions** Psychological functions, such as voluntary attention, complex memory processes, and problem solving, that entail the coordination of several cognitive processes and the use of *mediators.*

the child in their use. For Vygotsky, culture provides children with mediators that enable them to transform elementary mental functions into higher level cognitive skills.

The Zone of Proximal Development

Vygotsky's interest in the social origins of cognitive development led him to be less concerned with children's individual intellectual capabilities at a particular point in time than he was with the child's potential for intellectual growth through social experience (Daniels et al., 2007). To describe and assess this potential, Vygotsky proposed the notion of the **zone of proximal development (ZPD)**. The ZPD is defined as the difference between a child's "actual developmental level as determined by independent problem solving" and his "potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). The child's zone is, essentially, his region of sensitivity to learning in a particular area of cognitive development. When support for learning is targeted at the child's zone of proximal development, the child's level of competence in this area changes through this social experience. The concept of the zone of proximal development is twofold. First, it describes how cognitive development may arise from social interaction with more skilled partners. Second, it provides a method of assessing children's intellectual potential under optimal conditions—that is, conditions that are tailored to the child's specific learning needs and that build on the child's present capabilities.

Developmental researchers have demonstrated the value of this approach to cognitive development in studies of children's learning in many areas, including attention, memory, problem-solving skills, and planning. This research shows that children's understanding and cognitive skills can indeed be improved when adults or more skilled peers provide children with appropriate support for learning (Brown & Campione, 1997; Gauvain, 2001b; Rogoff, 1998). This is because when a child and a more skilled partner work together within a child's zone of proximal development, the child has the opportunity to engage in more advanced cognitive activities than she could undertake on her own. More experienced partners are able to describe or break down a cognitive activity, such as planning a series of errands, in ways that make it more understandable and accessible to the learner. More experienced partners also may model new strategies for solving the problem and encourage and support the child's involvement in the more difficult parts of the problem. Finally, the more experienced partner may take on or assume some of the more difficult parts of the problem so that the learner can concentrate on other aspects. For example, when an adult and child work together on a task that involves planning and carrying out errands in a model grocery store, the adult may keep track of how many errands have been planned, thereby allowing the child to concentrate on the best way to organize the remaining errands (Gauvain, 1992). In the study described in Box 8-1, children planned a series of errands with the help of an adult or a peer. Children learn different things when they collaborate with an adult versus a peer partner. Whereas adults provide children with more opportunities to learn about a task, peers can help children learn how to negotiate and share activities. The skills that can be obtained from both adult-child and peer interactions are important to social and cognitive development.

Vygotsky's theory has had considerable impact in the fields of psychology and education. **Scaffolding**, a form of instruction inspired by Vygotskian thinking, is a process by which the teacher adjusts the amount and type of support he offers to fit with the child's learning needs over the course of an interaction. In a classic demonstration, Wood et al. (1976) taught 3- and 5-year-olds to build a pyramid out of interlocking wooden blocks through both verbal and physical scaffolding. This scaffolding involved modeling the steps, encouraging the child to put the blocks in the right places, and segmenting the task into more easily understood steps. By careful monitoring of the child's progress, the teacher was able to constantly adjust the task to make it manageable for the child and provide assistance when needed. During the scaffolded learning experience, the

zone of proximal development (ZPD) The region of sensitivity for learning characterized by the difference between the developmental level of which a child is capable when working alone and the level she is capable of reaching with the aid of a more skilled partner.

scaffolding An instructional process in which the more knowledgeable partner adjusts the amount and type of support he offers to the child to fit with the child's learning needs over the course of the interaction.

teacher gradually reduces the amount of support he provides as the child becomes more skilled, so that eventually the child can do the task competently on her own.

One example of the application of these ideas to the classroom comes from the research of Annemarie Palinscar and Ann Brown (1984), who introduced an instructional technique called **reciprocal instruction** that is based on the zone of proximal development. This tutoring approach helps children in reading comprehension by having the learner collaborate with tutors who help children develop skills critical to comprehension, such as explication and elaboration. Ann Brown and her colleagues (Brown, 1994; Brown & Campione, 1997) have also developed a related classroom application called the **community of learners**. In this approach, children work together on sustained or long-range class projects, and the teacher serves as an expert guide who facilitates the process. The teacher in the community of learners has two roles: one as a scaffolding agent for the students and the other as a participant in the learning process. The students, who vary in knowledge and ability, actively help each other and learn through their interchanges. Finally, arrangements for learning through social processes can occur outside school. Cole and his colleagues (1996) developed one of the most impressive and extensive programs of this sort, called the Fifth Dimension. This after-school computer-based program was designed so that children could learn during collaborative activities that involve engaging and important cultural tools, such as computers, in a challenging but fun setting.

The zone of proximal development and related ideas describe children's learning in instructional situations. However, much of children's learning occurs as children participate in cultural activities. To describe this type of learning, Rogoff (1990) introduced the concept of **guided participation**. This approach highlights the fact that adults regularly support learning in the context of everyday activities by directing children's attention to, and involvement in, these activities. Sometimes, these activities are child focused, such as in play or an organized game, but oftentimes, they are adult activities in which the primary purpose is not to instruct children but to carry out the activity itself. In one form of guided participation, learning through **intent community participation**, Rogoff and her colleagues (2003) describe how children seek out ways to participate in authentic activities of their community alongside more experienced cultural members. For example, as a mother tries to make a cake, her child may ask if he can help. The mother may agree and then structure the task in a way that gives the child some real responsibility in the activity, such as stirring the ingredients that the mother has assembled. The mother then carefully supervises the child and provides assistance when needed. In this example, the child initiates participation and engages in the activity as a meaningful participant; that is, his actions, though guided by the adult, contribute in meaningful ways to the activity. Over time, if the child remains interested in and continues to be involved in making cakes with his mother, the child's involvement and the mother's activity will both change as the child's competence increases. Thus, over the course of participation, as a child's roles and responsibilities change, the child's understanding of the activity also changes. For Rogoff (2003), intent community participation is one of the most prevalent forms of children's learning.

The Role of Culture

An important feature of Vygotsky's approach is his emphasis on the role of culture in cognitive development (Cole, 2006). Cultures provide the institutions and social settings that support and direct cognitive development. Social institutions, such as schools, can significantly alter the ways in which people think. In these settings, particular ways of identifying and solving problems are emphasized along with the tools that aid problem solving. In every culture, both symbolic tools, such as language and mathematics, and material tools, such as pencil, paper, and computers, are used to support intelligent action. Once certain cultural tools become incorporated into intelligent action, it is difficult to imagine how the activity would occur without such tools. Think for a moment

reciprocal instruction A tutoring approach based on the ideas of the *zone of proximal development* and *scaffolding*.

community of learners An approach to classroom learning in which adults and children work together in shared activities, peers learn from each other, and the teacher serves as a guide.

guided participation Learning that occurs as children participate in activities of their community and are guided in their participation by the actions of more experienced partners in the setting.

intent community participation Children's participation in the authentic activities of their community with the purpose of learning about the activity.

BOX 8-1
Child Psychology in Action

WHO IS BETTER AT HELPING CHILDREN DEVELOP EFFICIENT PLANS: ADULT OR PEER PARTNERS?

Do children plan more efficiently when they work with an adult or a same-age peer? To find out, Radziszewska and Rogoff (1988) asked 9-year-olds to plan an errand in collaboration with either another 9-year-old or a parent as a partner.

Partners were given a map of an imaginary town (see Figure 8-9) and two lists of errands and were asked to plan a trip to obtain materials for a school play (e.g., to buy uniforms from the theatrical supplies store, paintbrushes from the paint shop, etc.). Partners were asked to be efficient to save gas, which required that they develop a plan that incorporated all these stores in sequence and minimized backtracking or other unnecessary travel.

Adult-child dyads were better planners than peer dyads. The adult-child dyads planned longer sequences of moves (average of 4.9 stores per move) than the peer dyads (average of 1.3 stores per move). Nearly half of the adult-child dyads planned the whole route at the onset, whereas none of the peer dyads did so. Children learned other helpful strategies when they worked with an adult, such as examining the map of the town carefully before making any moves and marking stores where they needed to shop with particular colors. Of great importance was the children's active involvement in the planning decisions, which the adults often verbalized and explained to their child partners. In contrast, peer partners often dominated the decision-making process, ignored their coworkers, and communicated very little.

Not only did children plan better with an adult, but they were also able to transfer what they had learned to later planning tasks that they did by themselves. In a later independent planning task, children who had worked with adults planned more efficient routes (20% shorter) than children who had previously planned with a peer.

As Vygotsky predicted, "children appear to benefit from participation in problem-solving with the guidance of partners who are skilled in accomplishing the task at hand" (Rogoff, 1990, p. 169).

about how you would remember your class material without the cultural tool of literacy, which mediates your learning and remembering in the classroom. There is cultural variation in the tools that support cognitive development. For example, in cultures in which verbal explanation is highly valued, activities such as oral narratives and storytelling assume much importance and are part of children's cognitive development in that community (Heath, 1998).

Vygotsky stressed that any attempt to assess children's cognitive development must consider the cultural context. He claimed that if we ignore the culturally specific nature of children's learning, we run the risk of seriously underestimating children's intellectual capabilities. Indeed, many cross-cultural studies have documented that children learn highly sophisticated and complex cognitive skills important in their culture (Cole, 2006; Rogoff, 2003). These skills are conveyed to children largely through social experiences. Social interactions with more experienced cultural members are especially important because these people are the most immediate representatives in children's lives of culturally organized ways of thinking and acting (Gauvain & Perez, 2006). Researchers have studied several social processes that promote children's learning of
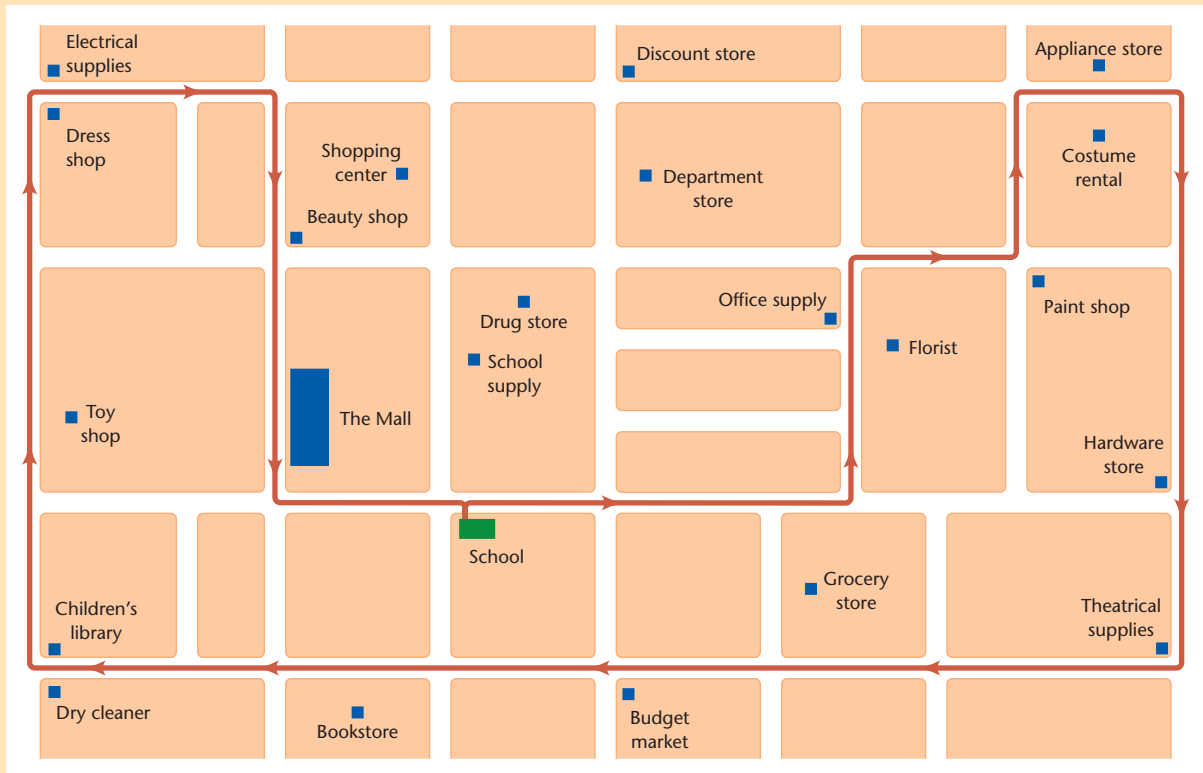
Figure 8-9

How adult guidance can help children plan efficiently

This map of an imaginary town shows the efficient route an adult-child pair planned for acquiring all the materials they would need to prepare for and stage a school play.

culturally valued skills, such as observational learning (Morelli et al., 2003), the social regulation of attention in infancy (Bornstein et al., 1991; Martini & Kirkpatrick, 1981), deliberate efforts to transfer knowledge from more to less experienced partners (Serpell & Hatano, 1997), social coordination during joint cognitive activity (Rogoff, 1998), and cognitive socialization through conversation and joint narratives (Mullen & Yi, 1995). Taken together, this research suggests that social opportunities for children's learning appear in many forms and that culture determines the frequency and manner with which these processes occur.

Vygotsky's theory not only leads us to an appreciation of different cultures and their values, but it also connects cultural values and practices directly to cognitive development. Mathematics provides an interesting example of this kind of link. Findings from research of the mathematics skills of children in Brazil who work as street vendors are discussed in Box 8-2. As this box shows, the children's daily interaction with addition and subtraction, as well as their lack of formal schooling, has led them to develop ways of performing mathematical functions that work for them in their daily activities. If, as Vygotsky insisted, we take culture into account in evaluating such children's cognitive

BOX 8-2

Risk and Resilience

STREET MATH AND SCHOOL MATH IN BRAZIL

Most human beings use mathematics and numerical reasoning every day of their lives. People calculate the costs of items in the supermarket, divide a snack equally among friends, and estimate how far it is to school and other destinations. In most cases, people learn the necessary skills to accomplish these mental acts in grade school, but not all children or adults have the opportunity to acquire a formal education. How do those without that opportunity perform such daily tasks? As the study we discuss here illustrates, even without formal training and in the face of hardship and risk, children demonstrate an amazing ability to develop the cognitive skills needed for their everyday functioning.

Carraher, Schliemann, and Carraher (1988) studied young vendors on the streets of Brazilian cities. These children, who are usually between 9 and 15 years of age, sell all kinds of goods, including coconuts, oranges, and other fruits, as well as candy and sweets, to pedestrians and riders of public transportation. The researchers were interested in the ability of these children to solve mathematical problems. After all, they reasoned, success at their trade relied on mathematical skill. Oftentimes, the children sold items in bulk, such as three oranges for 10 cruzados (the monetary unit in Brazil), but if a customer only wanted two oranges, the seller would need to figure out a fair price or risk losing the sale (Saxe, 1991). Also, because inflation is rampant in Brazil, the prices of one day may be different from the prices yesterday. As a result, there is no fixed pricing scheme for the children to memorize. To study these children's skill at mathematical calculations, the experimenters presented five young vendors, who ranged in age from 9 to 15 years old, with either a familiar commercial transaction between a vendor and a customer or a similar mathematics problem presented as it would be in school.

The young vendors revealed striking differences in their abilities to perform the two different types of problems. On the familiar commercial transaction, the children were correct 98% of the time, but when the same problems were presented in the form of a school

exercise, the percentage of correct answers dropped to 37. One notable difference in the children's solutions to the two types of problems was in the method they used: The children solved the commercial problem mentally but resorted to pencil and paper to solve the schoollike problem. They also used different problem-solving strategies in the two situations. The following protocol from one of the children illustrates these differences (Nunes & Bryant, 1996):

Commercial Transaction Problem

Customer: I'll take two coconuts. (Each coconut costs 40 cruzados, and the customer pays with a 500-cruzado bill.) What do I get back?

Child Vendor (before reaching for the customer's change): Eighty, ninety, one hundred, four hundred and twenty.

School-Type Problem

Test Question: What is 420 plus 80?

Child's Response: The child writes 42 on one line and 8 underneath and obtains 130 as the result. She apparently proceeds as follows: She adds the 8 and the 2, carries the 1, and then adds 1 1 4 1 8, obtaining 13. With the 0 already in the sum, she gets 130. (Note that the child is confusing multiplication and addition rules.)

The child has approached the same problem (420 + 80) in two distinctly different ways. On the street, she uses an "add-on" strategy efficiently to arrive at the correct answer, whereas in the academic setting, she applies strategies learned in school incorrectly. As Vygotsky would have predicted, this study shows the importance of context for understanding cognitive development. It also illustrates how cognitive tools or mediators—in this case, mathematical symbols and strategies—are integrated with thinking. Finally, it demonstrates the resilience of children at risk and their ability to survive and learn even complex cognitive skills despite the lack of opportunity for formal schooling.

skills, we must recognize the sophistication of their competence, which certainly exceeds what we might have expected. Studies such as these underscore the importance of considering the cultural context in our examination and evaluation of children's cognitive development.

The Role of Language

Language plays a central role in Vygotsky's approach to cognitive development. Language provides children with access to the ideas and understandings of other people. It also enables children to convey their own ideas and thoughts to others. Moreover, language, which is a cultural product, is the primary cultural tool that mediates individual mental functioning. Once children learn to use language, it gradually becomes incorporated into their thought processes.

EGOCENTRIC SPEECH AS A COGNITIVE AID   For Vygotsky, thought and speech are independent in early development. However, around the second year of life, they begin to join together when children start to use words to label objects. Within a year, speech assumes two forms: social, or communicative, speech and egocentric speech (also called *private speech*). For Vygotsky, **egocentric speech** is a form of self-directed monologue by which the child instructs herself in solving problems. For example, in his efforts to solve a dinosaur puzzle, a child might say, "First I'll put the tail piece here, then the claw goes over here and the head right there." By age 7 or 8, this form of speech becomes internalized in the thought process and becomes **inner speech**, a form of internal monologue that guides intelligent functioning. This view is quite different from Piaget's ideas about egocentrism and egocentric speech.

For Piaget, egocentric speech is a mental limitation of the preoperational stage in which the child's self-focused way of thinking leads children to explain natural phenomena in reference to the self—for example, by claiming that the moon follows the child home at night. The egocentric child, in Piaget's view, makes no effort to adapt his point of view in a way that makes it understandable to others. Moreover, unlike Vygotsky, who considered egocentric speech as one step in the path of the development of internalized knowledge, Piaget thought that egocentric speech served no useful cognitive function. Finally, Piaget suggested that egocentric speech diminishes at the end of the preoperational period, as the child's perspective-taking abilities improve, whereas Vygotsky thought that this kind of speech becomes internalized as thought.

Who is right? Most of the evidence favors Vygotsky's position. For example, children use more private or self-speech when they work on a difficult cognitive task; as a result, their performance improves, suggesting that children use this form of speech as a cognitive aid (Berk, 1992, 2006). In addition, in a longitudinal study of the developmental sequence of this kind of speech, Bivens and Berk (1990) found that egocentric speech does shift from external (audible, self-directed speech) to internal (silent, self-directed speech) between 7 and 10 years of age, supporting Vygotsky's view. Thus, as Vygotsky stated, language seems to serve as a tool for regulating cognition as well as for communicating.

USING THE ZONE OF PROXIMAL DEVELOPMENT IN TEACHING LANGUAGE   Vygotsky's notion of the zone of proximal development (ZPD) is the basis for the theory of instruction adopted by the Kamehameha Early Education Program, or KEEP, in Hawaii (Tharp & Gallimore, 1988). In this program, Native Hawaiian children receive language instruction as well as instruction in other subjects, such as reading, all based on the ZPD concept. This program is learner centered (Bransford et al., 1999) in that it was designed to incorporate the knowledge, skills, values, and beliefs that learners bring to the classroom and their lessons. The KEEP program was particularly concerned with how the cultural practices that Hawaiian children experience at home could be incorporated into the classroom. For example, the Native Hawaiian tradition of storytelling was used to develop the classroom practice of "talk-story," an approach to literacy instruction in which the teacher and the children jointly produce narratives about the focus of the day's lessons (Au & Jordan, 1981). This approach emphasizes social participation, along with story creation and

egocentric speech According to Vygotsky, a form of self-directed dialogue by which the child instructs herself in solving problems and formulating plans; as the child matures, this becomes internalized as *inner speech.*

inner speech Internalized egocentric speech that guides intellectual functioning.

comprehension, and its use has been related to improvements in the standardized reading scores of Native Hawaiian children.

The KEEP teacher uses modeling, questioning, and feedback, all of which are part of the methods of scaffolding and reciprocal instruction (Palinscar & Brown, 1984). For example, in the following exchange, a teacher uses repetition, rewording, and expansion as she questions the child and seeks to clarify his statement (Tharp & Gallimore, 1988, p. 143).

> **Child:** Probably, probably have snow on the . . . stuff and . . . thing, thing was heavy and thing fall.
>
> **Teacher:** Oh, you mean there might be so much snow and ice on the plane that it couldn't fly?

Through these instructional techniques, children in the KEEP program are aided as they learn to use language as a tool in the school setting. This program builds on the cultural experiences children have when they enter school rather than ignoring this rich foundation of learning. Based on their research at KEEP, Tharp and Gallimore (1988) argue that minority or other "nonstandard dialect speakers" can benefit greatly from opportunities to converse through goal-oriented activities with a responsive yet uncritical teacher who speaks standard English. As Tharp and Gallimore point out, however, this kind of teaching is not common in U.S. schools.

EVALUATION OF VYGOTSKY'S THEORY

Vygotsky's approach offers a perspective on cognitive development that emphasizes the culturally organized and socially mediated nature of this development. As such, it overcomes some of the limitations of Piaget's focus on cognitive development as an individual or solitary endeavor.

Strengths of the Theory

Vygotsky's theory has helped to make developmental psychologists more aware of the importance of the immediate social contexts of learning and cognition. In particular, through the notion of the zone of proximal development and the related concepts of scaffolding and guided participation, this approach has pointed to new ways of assessing children's cognitive potential and of teaching reading, mathematics, and writing. Reciprocal instruction, the community of learners model, the Fifth Dimension, and the KEEP program are excellent examples of the application of these principles to educational settings. In addition, Vygotsky's approach has increased our appreciation of the profound importance of culture in cognitive development. This approach is particularly useful in a multiethnic society, like the United States, in that it provides a theoretical base for examining the ways that children of different cultural and ethnic traditions approach cognitive tasks and schooling. Vygotsky's theory also provides a way of conceptualizing the role played by tools of thinking in cognitive development. This theory addresses how tools such as literacy and numerical systems, which are products of culture, get passed on across generations and become incorporated into the ways children learn to think and solve problems as they grow.

Does Vygotsky's Theory Describe Developmental Change?

Although Vygotsky's theory has recently inspired a great deal of research, the theory has several limitations, largely pertaining to its explanation of development. Although

Making the Connections 8

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 8 and discussions in other chapters of this book.

Chapter 8
Cognitive Development: Piaget and Vygotsky

→ **The development of self is linked with infant-parent attachment.**
In Chapter 6, "Emotional Development and Attachment," p. 221

→ **Development: Scaffolding can be an effective tool in learning language.**
In Chapter 7, "Language and Communication," p. 239

→ **Theory of mind (being aware of others' intentions)
is linked with less aggressive behavior.**
In Chapter 14, "Morality, Altruism, and Aggression," p. 529

the approach emphasizes change over time in a specific learning experience, or **microgenetic change**, and the role of long-term historical influences on intellectual development as embodied in cultural practices and tools, this approach is not very specific in relation to age-related, or *ontogenetic*, change. Vygotsky did not provide a detailed description of how children's thinking changes with age (Miller, 2002). This approach also does not describe how changes in physical, social, and emotional capabilities contribute to changes in children's cognitive abilities.

microgenetic change
Changes associated with learning that occur over the time of a specific learning experience or episode.

Overall Assessment

In a sense, Vygotsky left developmental psychology a unique framework for thinking about cognitive development rather than a fully specified theory. Filling in the details of this theoretical position remains a challenge for the future. However, for now, most developmentalists agree that this approach offers a unique understanding of human cognition and that it holds great promise as a way of thinking about cognitive development in social and cultural contexts.

SUMMARY

- **Cognition** is the mental activity and behavior that allows us to understand the world. It includes the functions of learning, perception, memory, and thinking, and it is influenced by biological, environmental, experiential, social, and motivational factors. A variety of theories have been proposed to explain the pattern of cognitive development seen in children.

Piaget's Theory of Cognitive Development

- Piaget's theory concentrates on the cognitive capabilities of children of different ages. Piaget based his theory on observations of his own and other children as they answered questions during structured and unstructured interviews.

Piaget's Main Tenet: The Child Actively Seeks Knowledge

- According to Piaget, children actively seek out information and adapt it to the knowledge and conceptions of the world that they already have. In this **constructivist view**, children construct their understanding of reality from their own experiences. Children organize their knowledge into increasingly complex cognitive structures called **schemas**.

- Children possess many different schemas, and these change as children develop. In the newborn, the schemas take the form of innate reflexes and reaction patterns, such as sucking. As the child grows and gains experience, the schemas shift from motor activities to mental activities called **operations**. These operations become increasingly complex with age.

- Piaget suggested that schemas are modified according to the principles of organization and adaptation. **Organization** is the predisposition to combine simple physical or psychological structures into more complex systems. **Adaptation** involves the two complementary processes of **assimilation**, or fitting new experiences into current cognitive schemas, and **accommodation**, or adjusting current schemas to fit the new experiences.

The Stages of Cognitive Development

- Piaget divided intellectual development into four stages that reflect changes in children's cognitive structures. The attainments of earlier stages are essential to reach later periods of development. All children go through the stages in the same order, although not necessarily at the same ages.

- During the first 2 years of life, called the **sensorimotor stage**, a child makes the transition from relying on reflexes to using internal representations of external events. Piaget divided this period into six substages, during which the child physically explores the environment, developing such abilities as **symbolic thought** and **deferred imitation**. Throughout these substages, which include **basic reflex activity**, **primary circular reactions**, **secondary circular reactions**, **coordination of secondary circular reactions**, **tertiary circular reactions**, and **inventing new means by mental combination**, children gradually come to understand the world, including **object permanence**. Critics have suggested that children may acquire object permanence, as well as other ideas about the properties of objects and such principles of

the physical world as causality, earlier than Piaget thought.

- Recently, researchers interested in early knowledge systems have begun to study the understanding by very young infants of the physical world, including physical laws such as **containment**. Much of this research considers this type of understanding basic to human functioning and refers to it as core knowledge. Debate continues as to whether **core knowledge systems** are innate or learned early in life, as well as how to interpret the evidence from very young infants that explores these ideas.

- The major developmental milestone during the **preoperational stage** is the development of the **symbolic function**, or the ability to use symbols such as words, images, and gestures to represent objects and events. This can be seen in the rapid development of language, in imaginative play, and in an increase in deferred imitation. Piaget divided this stage into the preconceptual substage and the intuitive substage.

- During the **preconceptual substage**, children's thinking is limited by **animistic thinking**, the tendency to attribute lifelike characteristics to inanimate objects, and by **egocentrism**, a tendency to view things from one's own perspective and to have difficulty seeing things from another person's perspective. A shift away from egocentrism may be related to the development of role-taking abilities.

- During the **intuitive substage**, children are able to use certain mental operations, but they do not seem to be aware of the principles used because they cannot explain them. Limitations in their thinking are still found in problems involving part-whole relations, classification, and conservation.

- The most important acquisition of the preoperational stage is an elementary understanding of **conservation**. Typically, the child learns to conserve number at the end of this stage but cannot yet conserve other physical properties such as mass and volume. The concept of **horizontal décalage** explains this unevenness of children's cognitive achievements. In recent years, however, critics have suggested that children may achieve notions of conservation earlier than Piaget believed.

- Piaget proposed that three characteristics of preoperational thought limit children's thinking. The first is the child's inability to understand **reversibility**, or the idea that logical operations can be changed back to their original state and that this change demonstrates the logical steps that were involved in an operation. The second is the tendency to maintain an **ends over means focus**,

looking at the end state itself rather than at the process of transformation. The third characteristic is **centration**, or focusing on only one dimension of a problem.

- During the **concrete operational stage**, children acquire the ability to perform most of the tasks that they were unable to master in the preceding stage, including conservation of various substances, classification, and part-whole relations.

- Children in the **formal operations stage** can use flexible and abstract reasoning, test mental hypotheses, and consider multiple possibilities for the solution to a problem. Not all children or adults attain this stage. The nature of a problem and the opportunity to attend formal schooling that emphasizes this type of thinking are related to the use of formal operations.

- Although Piaget did not emphasize how the child learns to distinguish self from others, his concepts of egocentrism and object permanence have clear implications for this process and the beginnings of social cognition. Recent research on children's **theory of mind** is uncovering when and how children come to understand the properties of the mind, including that the mind guides the child's own behavior and the behavior of others. Social and cultural experiences appear to be especially important to the development of social cognition.

Evaluation of Piaget's Theory

- Piaget's theory integrates and illuminates a broad spectrum of issues pertaining to children's understanding and use of knowledge, and it has stimulated an enormous amount of research. Among the most significant of Piaget's many ideas are that children actively construct their knowledge of the world, that the errors they make provide important clues about their thinking, and that cognitive development can be discerned in perceptual-motor behavior as well as in language skills.

- Current evidence indicates that infants and children grasp many concepts, such as object permanence, causality, conservation, and the perspectives of another, considerably earlier than Piaget thought. Research also suggests that cognitive development may be modified by cultural experiences, and that development may not occur in the distinct and qualitatively different stages Piaget proposed.

- Piaget's ideas have been very influential in the field of cognitive development. Despite limitations in his theorizing and methods, Piaget asked and proposed answers to important questions in an innovative way, stimulating the work of other investigators.

Vygotsky's Sociocultural Theory of Cognitive Development

- Vygotsky's theory emphasizes the critical role played by the social world in facilitating the child's development. According to his theory, children generally internalize thought processes that first occur through interaction with others in the social environment. Qualitative transitions between **elementary mental functions** and **higher mental functions** occur because of shifts in the use of **mediators** such as language and other symbols. The acquisition and use of language plays a primary role in children's developing intellectual abilities.

- Vygotsky's interest in the child's potential for intellectual growth led him to develop the concept of the **zone of proximal development**. In recent years, this concept has led to the study of **scaffolding**, an instructional process in which the teacher adjusts the amount and type of support offered to the child to suit the child's abilities, withdrawing support as the child becomes more skilled. The concepts of reciprocal instruction, a community of learners, and guided participation also stem from these ideas. In **reciprocal instruction** and a **community of learners**, individuals—whose learning abilities vary—support children's learning through social interaction. **Guided participation** emphasizes how cognitive development proceeds throughout the world as children actively participate, and are guided by more experienced people, in activities valued in their cultural community. Children seek opportunities to learn about activities in their community through the process of **intent community participation**.

- Two principles of cultural influence inform Vygotsky's theory. First, cultures vary widely in the kinds of institutions, settings, and tools they offer to facilitate children's development. Second, in assessing children's cognitive development, we may seriously underestimate children's cognitive development unless we consider these variations and cultural contexts.

- Language plays an important role in Vygotskian theory. As children begin to use social speech, **egocentric speech**, and **inner speech**, they learn to communicate and to form thoughts and regulate intellectual functions.

Evaluation of Vygotsky's Theory

- Vygotsky drew attention to the importance of the social and cultural context in which learning and the evolution of cognitive skills take place and to the influence of peers and adults on the child's development. He pointed out that the particularities of a given culture determine the nature and manner of functioning of social interactions and of the societal institutions that influence how children think and learn. Interest in the effect of social and cultural variation on the child's development has created a research focus that is especially useful in multiethnic societies such as the United States.

- Vygotsky's approach mainly offers a general outline that addresses unique and important questions about the nature and course of cognitive development. The theory's focus is on **microgenetic change**, for it examines change over a learning episode rather than change associated with age (*ontogenetic change*). Vygotsky's ideas, especially in their emphasis on the social and cultural aspects of learning and cognition, challenge future researchers to explore the role of context in greater depth.

EXPLORE AND DISCUSS

1. How do changes in infants' thinking, as described by Piaget, contribute to the infant's increasing ability to interact with people and objects in the world?

2. Imagine you are an educational consultant and you have been asked to consult at a school where several second- and third-grade children are having difficulty understanding scientific concepts that involve the conservation of weight and volume. How would you explain this difficulty and what would you advise the teachers to do to help these children?

3. If you were to design a new IQ test based on Vygotsky's idea of the zone of proximal development, what would it be like?

4. How could Vygotsky's ideas about culture and development be used to understand children's learning and development in a multicultural society such as ours?

Christian Pierre (b. 1962). *Modern Madonna, 1996. Private Collection.*

9.

Cognitive Development: The Information-Processing Approach

Every day of their lives, children engage in activities that require thinking: deciding what to wear, remembering to take their homework to school, solving problems on a math assignment, or trying to understand why their best friend is angry with them. This chapter focuses on the cognitive skills that children use during these activities as well as the way these skills change across childhood. We focus on approaches to cognitive development that are based on an information-processing view of cognition (Munakata, 2006). Information processing is an approach to cognitive development that views human beings as possessing an array of cognitive processes that help them to understand and make use of information they get from their experiences in the world.

The information-processing perspective originated in the study of adult cognition, and several approaches to cognitive development are based on this perspective. One approach, the *multistore model*, focuses on the steps that the mind goes through as information is processed. Another approach, called a *connectionist view*, examines cognitive processing as a system of connections of the neural network that makes up the human brain. Another approach involves combining many of Piaget's ideas but focusing on cognitive processing rather than on stages of development. As we will see, this view, referred to as a *neo-Piagetian approach*, proposes that the stage-related changes that Piaget described are brought about by changes in the ways children process information.

After describing the multistore, connectionist, and neo-Piagetian approaches, we explore several basic cognitive abilities and discuss how these abilities change with development. We begin by describing changes in attention, and then we consider memory and the child's developing competence in storing and retrieving information.

Following this, we discuss children's increasing ability to solve various kinds of problems, including children's developing skill at using strategies to help them solve problems. Finally, we look at children's knowledge of their own mental capabilities, referred to as *metacognition*.

As you study this chapter, keep in mind that the many different theories and approaches to cognitive development discussed in this chapter and Chapter 8 are not necessarily competing with one another. In many cases, the theories address different aspects of cognitive development. To date, no single theory of cognitive development explains all of mental functioning and its development. Although such a theory is a goal of the field at large, researchers realize that the human cognitive system is extremely complex and that no single theory may be able to explain this entire process.

INFORMATION-PROCESSING THEORY

information-processing approaches Theories of development that focus on the flow of information through the cognitive system.

Information-processing approaches to the study of cognition often use the computer as an analog for describing how the human mind works. Like the computer, the human mind is seen as an organized system that processes information through a series of logical rules or steps. Information from the environment, or input, initially enters the cognitive system through the processes of perception, discussed in Chapter 4, and attention. This information is then encoded into some symbolic form so that it can be examined mentally. Then it is either expelled because it is no longer needed or saved so that at some later point it can be retrieved and used for thinking or solving problems. Like the computer, the mind is limited in both the amount and type of information it can process. Finally, just as the computer can be made into a better information processor by changes in its hardware (e.g., microchips) and its software (programming), so are human thinkers able to become more cognitively skilled through changes in their brains and sensory systems (hardware) and in the rules and strategies of thinking (software) that they learn over the course of development.

A primary quality of the human cognition system is its flexibility. Human thinking can be adapted to many different situations. However, the human cognitive system has two main limitations: the amount of information that it can process at one time and the speed with which it can process information. In fact, computers can process information much faster than the human mind. Does this mean that the human mind is less effective at processing information than a computer? No, the rapid-fire speed of the computer reflects its singular design: to solve specific types of problems in the way it is programmed to solve them. In contrast, when the human mind solves problems, it has the flexibility to consider a broad range of factors, and as a result, it takes longer to do the job. In essence, the human mind is a truly unique kind of information-processing system with vast problem-solving potential.

There are four basic assumptions that all psychologists who study cognitive development using the information-processing perspective share. After discussing these assumptions, we describe some of the best-known approaches that are based on this perspective.

Basic Assumptions of the Information-Processing Approach

According to Siegler and Alibali (2005), the information-processing approach is characterized by several main assumptions. First, *thinking is information processing*. In other words, mental activity involves taking information into the mind and operating on it in ways that make it usable. In terms of cognitive development, this assumption directs attention to questions about how thinking processes, such as attending to and remembering information, change as children get older.

A second assumption is that there are *mechanisms or processes of change that underlie the processing of information*. For instance, with development, children become better able to represent or encode information in their minds, and this mechanism helps them solve problems more effectively. The four key mechanisms of information processing—encoding, strategy construction, automatization, and generalization—are discussed in more detail later in the chapter. Together, these mechanisms help bring about change in children's cognitive skills.

Information-processing theory also assumes that cognitive development is a *self-modifying process*. In other words, the child uses the strategies she has acquired from earlier problem solutions to modify her responses to a new problem. In this way, children play an active role in their own cognitive development.

Another assumption of an information-processing approach is that *careful task analysis* is crucial. According to this view, in addition to the child's own level of development, the task or problem situation itself influences the child's cognitive performance. Careful task analysis, coupled with accurate observation of a child's performance on the task, can reveal much about how children of different ages understand and solve problems. Careful task analysis often involves *error analysis*, or attending to the errors children make. These errors can be especially enlightening about development when they are similar across the same age group of children. Such analysis often relies on a method called **microgenetic analysis**, which involves very detailed examination of how a child solves a problem over a single learning episode or over several episodes that occur close in time (Siegler, 2006). This method is rather like watching a film in slow motion as the investigator observes in detail the way a child arrives at a problem solution.

Taken together, these four assumptions form the basis of an information-processing perspective. The next section discusses several of the approaches or models that are derived from an information-processing perspective and that guide research on cognitive development.

Information-Processing Models

Several types of approaches or models are used to describe cognition from an information-processing perspective. In this section, we discuss three models that have been influential to the study of cognitive development. These are the multistore model, connectionist models, and the neo-Piagetian model.

THE MULTISTORE MODEL   This model describes how information enters and flows through the mind as it is processed (Atkinson & Shiffrin, 1968). It describes this process in terms of the various types of storage systems that are involved, and hence the name **multistore model** (Figure 9-1). As an initial step, we acquire information from the environment through our senses. This sensory information enters the system through the **sensory register**. Although the information in the sensory register is stored in its original form—that is, images are stored visually, sounds aurally, and so forth—this storage is very brief. Sperling (1960) showed that the sensory register can store visual sensory information for only 1 second! In addition, this storage capacity changes little over development: Research has shown, for example, that 5-year-olds and adults have the same time limitations on their ability to store sensory information (Morrison et al., 1974).

In the next step of processing, information in the sensory register is transformed, or encoded, into a mental representation and then placed in the storage area referred to as **short-term memory**, or **working memory**. Short-term memory can best be thought of as the conscious "work space" of the mind (Bjorklund, 2005). Short-term memory is limited in the number of meaningful units or chunks of information that it can hold at any one time, as well as in how long it can hold this information without any active effort to retain it. Without a specific effort, such as rehearsal, we generally lose information from

microgenetic analysis A very detailed examination of how a child solves a problem.

multistore model A model of information processing in which information moves through a series of organized processing units—*sensory register, short-term memory*, and *long-term memory*.

sensory register The mental processing unit that takes information from the environment and stores it in original form for brief periods of time.

short-term, or working, memory The mental processing unit in which information is stored temporarily; the "work space" of the mind, where a decision is made to discard information, work on it, or transfer it to permanent storage in *long-term memory*.
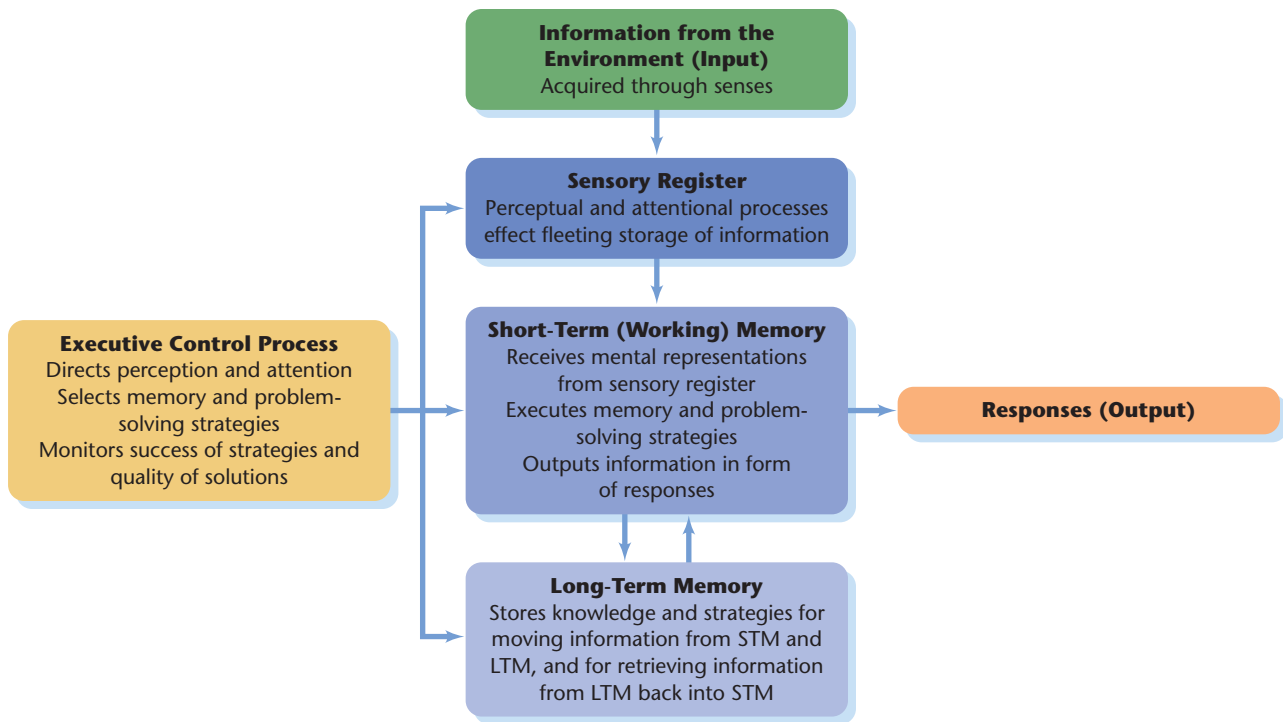
Figure 9-1

A multistore model of information processing

A model of information processing that describes the flow of information through various stores of the cognitive system.
Note: The executive control process is discussed on pages 319–320.

Source: Based on Atkinson & Shiffrin, 1968.

short-term memory within 15 to 30 seconds. Although we might often try to get around this limitation, it has functional value in that it allows us to respond to a rather continuous flow of incoming information. The ability to use active strategies like rehearsal to keep information in short-term memory improves with age. For example, the faster a child can rehearse a piece of information—let's say, a new word—the more information can be retained (Hitch & Towse, 1995). Figure 9-2 shows how older children's more rapid rehearsal enables them to remember more words.

long-term memory The mental processing unit in which information may be stored permanently and from which it may later be retrieved.

Long-term memory is the term used to describe knowledge that is retained over a long period of time. Long-term memory contains information about objects, events, rules, types of problems and ways to solve them, and general knowledge about the world, such as vocabulary and what flowers smell like. In addition, long-term memory stores the strategies for building new knowledge, such as ways of encoding, representing, and retaining information. Information transferred from short- to long-term memory can be retained for an indefinite period of time.

The multistore model has directed research in cognitive development in a number of ways. In particular, this research has examined changes in short-term memory and the way these changes influence the development of long-term memory or the knowledge base.

connectionist models
Information-processing approaches that describe mental processes in terms of the interconnections of the neural network.

CONNECTIONIST MODELS   An alternative approach to how information is processed is described in **connectionist models**. These models emphasize the biological components of information processing, referred to as neural networks. In this approach, information is described as an elaborate set of neural connections, and think-
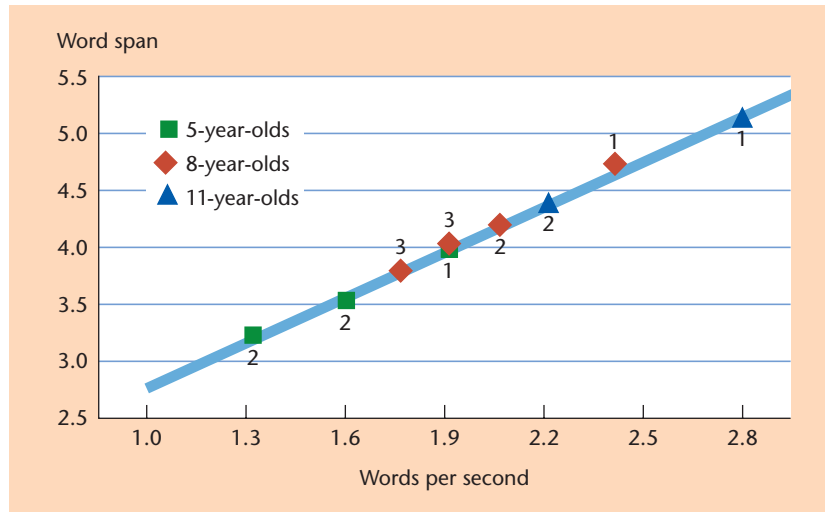
Figure 9-2

Memory skills improve with age

Experimenters asked children in three age groups to memorize a list of words. The older the child, the faster she could pronounce the words in rehearsing them, and the more words she could retain in working memory. (Numbers by data points indicate number of syllables in the word.) For example, 11-year-olds could pronounce 2.8 single-syllable words per second and could remember about 5 single-syllable words, whereas 5-year-olds could pronounce 1.9 single-syllable words per second and could remember about 4 single-syllable words.

Source: From Siegler, Robert S.; Alibali, Martha W., *Children's Thinking*, 4th Edition, © 2005. Adapted and reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ.

ing involves processing information as it spreads throughout the network, referred to as *parallel distributed processing.*

In terms of cognitive development, psychologists who adopt this approach are interested in how these neural connections are organized, how they change over the course of development, and how different connections are activated as a child thinks and solves problems (Elman et al., 1998). Researchers have attempted to simulate various aspects of cognitive development using connectionist ideas, including language learning, object knowledge, and conceptual development (MacWhinney, 1996; Munakata et al., 1997; Plunkett et al., 1997). The contributions that developmental psychologists can make to this approach are important in that a full understanding of neural networks will require a description of how these networks change with development.

NEO-PIAGETIAN INFORMATION-PROCESSING MODELS

There are also **neo-Piagetian theories** of information processing. These theories attempt to integrate Piaget's ideas with that of an information-processing perspective. According to Robbie Case (1992, 1998), the proponent of one of these theories, the stagelike development of cognition described by Piaget is based on improvements in memory capacity and executive control, two features of an information-processing system. Like Piaget, Case divides development into four stages (Table 9-1). Each of these stages entails an increasingly sophisticated **executive control structure**, which is a "mental blueprint or plan for solving a class of problems." An executive control structure has three components (Case, 1984): a representation of the problem, a representation of the goal of the problem, and a representation of a strategy for attaining the goal. Table 9-1 provides examples of how developmental changes in the executive control system lead to different ways of processing information about the world. Case and his colleagues have applied this theory to a variety of tasks and domains, including scientific reasoning, the analysis of social problems, and mathematics (see Case, 1998, for a review of this research).

neo-Piagetian theories Theories of cognitive development that reinterpret Piaget's concepts from an information-processing perspective.

executive control structure According to Case, a mental blueprint or plan for solving a class of problems.

Cognitive Processes: What Are They? How Do They Contribute to Development?

As children grow and develop, they become more skilled and efficient in using **cognitive processes**, which are the mechanisms or ways that the human mental system operates on information. Thus, the information-processing perspective is focused on

cognitive processes Ways that the human mental system operates on information.

Table 9-1

Case's stages of cognitive development

	Examples of Mental Representations and Operations
Sensorimotor Control Structures (Birth to 1.5 Years) Infants' mental representations are linked to their physical movement. Their executive control structures are combinations of physical objects and motor actions.	A child sees a frightening face (sensory) and runs out of the room (motor).
Relational Control Structures (1.5 to 5 Years) Children have internal representations of objects, people, activities, and events and how they may be related. Children's executive control structures now include cause-and-effect statements and explicit goal structures.	The child produces a mental image of the frightening face (representation) he saw the day before and draws a picture of it (action on representation).
Dimensional Control Structures (5 to 11 Years) Children use logical processes to understand the physical world, as in comparing two or even three dimensions such as distance, number, and weight. They can represent complex stimuli mentally and can act on these representations with simple transformations.	A child may realize that two friends don't like each other (complex representation) and may tell them that they could all have more fun if they were all friends (simple transformation).
Abstract Control Structures (11 to 18.5 Years) Building on the dimensional control structures of the preceding stage, children begin to use abstract systems of thought that allow them to perform higher order reasoning tasks and more complex transformations of information.	The child may realize that such direct attempts to create friendships rarely succeed (abstract representation) and thus may not tell his friends what he proposes but instead plan activities in which they will all engage with the hope that greater familiarity and contact will produce the desired relationships (complex transformation).

Sources: Case, 1985; Siegler, 1998.

gradual and quantitative changes in mental functioning. Our discussion focuses on the four cognitive processes that change with development: encoding and representation, the construction of strategies, automatization, and generalization. These four processes are critical to the development of the information-processing system.

ENCODING AND MENTAL REPRESENTATION   A massive amount of information enters the human information-processing system every day. Rather than try to retain and store every bit of information in the form in which we experience it, we encode, or change into mental representations, only the information we consider relevant. If this **encoding** process is efficient, crucial information is obtained, but if it is inefficient, critical information may be lost. As we will see later, the ability to attend to relevant information improves with development.

Mental representation is the term used to describe information that is stored mentally in some form (e.g., verbal, pictorial, procedural). A mental representation depends on the child's understanding that one thing (e.g., a word such as *chair*) can stand for or "represent" something else (e.g., an actual chair). Some developmentalists have proposed that changes in the type and complexity of mental representations underlie much of cognitive development (Bjorklund, 2005).

STRATEGIES   The development and use of strategies are some of the most important changes that occur in children's thinking over childhood (Pressley & Hilden, 2006). **Strategies** are conscious cognitive or behavioral activities used to enhance mental performance. An example of strategy use appears in children's counting. When we present younger children with an addition problem such as 3 + 14, they will attempt to solve it by using the *count-all* strategy, counting from 1 up to the first term of the problem (i.e., 3) and then continuing to count the number of the second term (i.e., 14 more) until they

encoding The transformation of information from the environment into a mental representation.

mental representation Information stored mentally in some form (e.g., verbal, pictorial, procedural).

strategies Conscious cognitive or behavioral activities used to enhance mental performance.

arrive at the answer of 17. Older children, in contrast, will use a more efficient strategy known as the *min rule*. Using this strategy to solve the problem, a child will begin counting from the larger of the two addends (14) and continue upward, adding the amount of the smaller number, thus counting "14, 15, 16, 17" to arrive at the answer. Thus, the child does the minimum amount of counting necessary for solving the problem (Groen & Parkman, 1972).

The main purpose of a strategy is to decrease the load on the child's information-processing system by increasing the efficiency of the system and thus freeing up space for the various tasks necessary for solving the problem. Another way to increase the efficiency of the information-processing system is to automatize certain aspects of the solution process.

AUTOMATIZATION **Automatization** involves making behaviors that once were conscious and controlled into unconscious and automatic ones. A good example of automatization is an adult's learning to drive a car with a stick shift. At first, every shifting of the gears is slow, with the driver concentrating on each aspect of shifting to do it right. With practice, however, the driver can shift gears quickly and efficiently, unaware of the individual steps involved and often unaware of shifting altogether. In the same way, the child who has developed a memorization strategy for calculating simple addition or multiplication problems is able, in time, to use this strategy without thinking about it (Siegler & Alibali, 2005). For example, a child who has memorized the mathematical formula that $2 + 2 = 4$ can use this stored knowledge in giving a quick answer to the question "What is $2 + 2$?" In contrast, a child who hasn't memorized the formula may have to stop, think, and perhaps count on his fingers ($[1 + 1] + [1 + 1]$) to figure out the answer.

GENERALIZATION Initially, the strategies that children develop to solve a given problem tend to be quite specific to the task at hand. Through the process of **generalization**, children apply a strategy learned while solving a problem in one situation to a similar problem in a new situation. Generalization does not happen overnight, though, and children may need to gain familiarity with the use of a rule, using it many times over, before they can successfully generalize it to new situations. Suppose, for example, that the child who used the min rule in the earlier addition problem had arrived at this solution in school. Coming home after school, he finds that his mother has bought some jelly beans, and he decides to count the jelly beans so that he and his brother will have the same number of candies. Even though he applied the min rule successfully at school, now that he is presented with a set of concrete objects—a different situation—he may revert to the less sophisticated and more time-consuming strategy of counting all the items. However, with time and experience, the more general use of a strategy across problem situations occurs.

Using objects of different shapes, colors, and sizes (sometimes called manipulatives) can help children in the early grades learn to count, do simple arithmetic problems, and sort objects into categories.

automatization The process of transforming conscious, controlled behaviors into unconscious and automatic ones.

generalization The application of a strategy learned while solving a problem in one situation to a similar problem in a new situation.

The Roles of the Executive Control Process and the Knowledge Base in Information Processing

All the processes we've discussed help children increase their efficiency in processing information. It is also important to know when to use them and to monitor their use to make sure they are effective. The **executive control process** guides the child

executive control process A cognitive process that serves to control, guide, and monitor the success of a problem-solving approach a child uses.

Figure 9-3

Knowledge and children's memory

In this test of the hypothesis that amount of knowledge in a particular domain plays a greater role in memory than simple memory capacity, young chess players recalled more chess-piece positions than nonchess-playing adults could (a), and they needed fewer trials than the adults to reach perfect recall (b).

Source: Chi, 1978.

(a) Items recalled after one viewing — Chess positions, Numbers (Children, Adults)
(b) Trials needed for perfect recall — Chess positions, Numbers (Children, Adults)
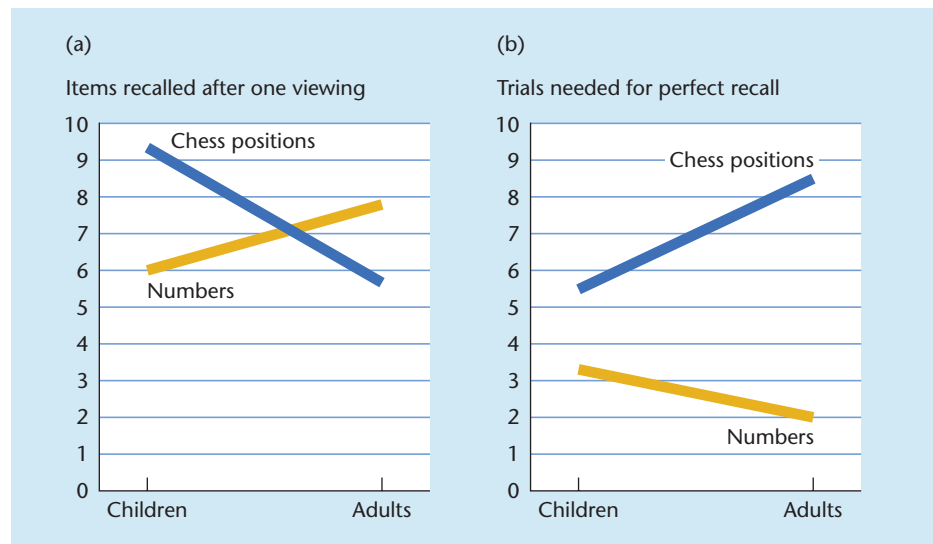
in the selection and use of strategies. Between the ages of 3 and 12, brain systems that develop—in particular, changes in the prefrontal cortex—are central to the development of the executive control process. Over these years, the child's executive process shows dramatic development. Whereas the preschooler may apply a single ineffective strategy to a variety of tasks and not change course, the 12-year-old is able to master a wide range of intellectual tasks and use strategies that are suited to the problem at hand. Toward the end of this chapter, we take up this topic again when we discuss metacognition, which relies on the executive control process.

One critical feature of information processing that we have yet to discuss is the role of knowledge itself (Keil, 2006). A child's knowledge base, in particular his familiarity with the domain or type of problem he is trying to solve, plays a major role in his abilities to process information and solve problems (Pressley & Hilden, 2006). Research has shown that when children are given problems in an area in which they know a great deal, they will equal, and even surpass, the performance of less knowledgeable adults (Bedard & Chi, 1992; Chi, 1978).

To study this topic, Michelene Chi (1978) tested both children and adults on their ability to recall either a set of numbers or specific chess-piece positions. The children were experienced chess players, but the adults had only a basic understanding of the game. Chi found that although the third graders and eighth graders could not remember as many numbers as the adults on an immediate recall test, and needed more viewings to reach perfect recall, they far surpassed the adults in remembering chess-piece positions (Figure 9-3). Chi concluded that the children's knowledge of chess played an important role in their memory performance and that the adult's superiority in recalling numbers may have reflected their generally greater familiarity with number systems. These results suggest that expertise can enhance cognitive processing in children in a familiar domain but that this expertise does not influence performance in other domains. These results challenge stagelike views of cognitive development. It appears that when children have expertise in a domain, they function at a more advanced level (or stage) in this domain than they do when they are thinking about problems outside that domain.

DEVELOPMENTAL CHANGES IN SOME SIGNIFICANT COGNITIVE ABILITIES

In this section, we consider what has been learned about the development of some important cognitive abilities when they have been studied using an information-processing

approach. These abilities include attention, planning, memory, problem solving, and reasoning. From an information-processing perspective, each of these abilities plays an important role in how information is organized and operated on.

Attention

A group of children in the same situation do not necessarily take in the same information. Each child's **attention** may be focused on different aspects of the environment. Attention involves the identification and selection of particular sensory input for more detailed processing. For example, one child in a classroom who is focusing on the teacher will hear and understand the lesson, but another child who is more interested in a whispered message from a classmate may focus on that sound and regard the teacher's voice as background noise. How children's experiences affect them depends on what aspects of a situation children attend to and what meaning this information has for them. Attention is a complex process that changes substantially with development. Children have difficulty controlling their attention when they are young. As they develop, the control they have over their attention increases.

attention The identification and selection of particular sensory input for more detailed processing.

CONTROL OF ATTENTION Very young children can sustain their attention for only short periods. However, this ability increases steadily over development (Ruff & Rothbart, 1996). Even over the first year of life, there are a number of changes in the focus and duration of attention. Between 2 and 3 months of age, the focus of the infant's attention shifts from the external contours of objects toward their internal features. From 3 to 9 months of age, infants show increasing control over their attention, and by 9 months of age, infants can use attention to solve simple problems such as getting toys from behind barriers (Willatts, 1990). Over the first few years of life, the duration of attention increases and distractibility decreases. Ruff and Capozzoli (2003) found that 10-month-olds were far more distractible than 26- and 42-month-olds when playing with toys. The youngest group responded more frequently and looked longer at distracters, which in this case were images and sounds from a video player, than the older children. Interestingly, some of the 42-month-old children increased their attentional focus in the presence of the distracters. This pattern suggests that children as young as 42 months of age may be less distractible when an activity fully engages their attention. Although this may sound surprising, research with preschool and school-age children

Attention is important in learning to read. Children respond best to material that's appropriate to their age level, and at about 3, they begin making marked gains in their ability to focus their attention.

Duration of focused attention (seconds)
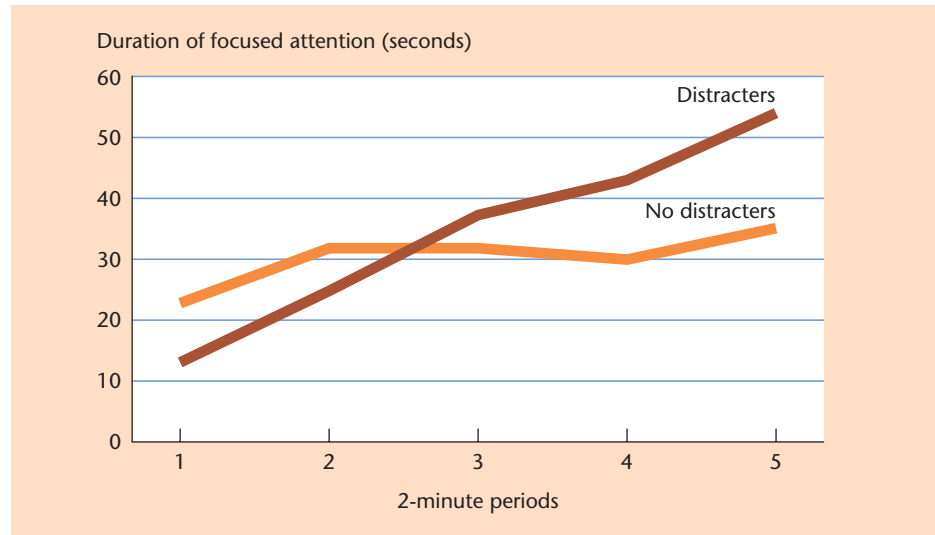
shows that distraction can sometimes facilitate children's performance. For example, Turnure (1970) found that preschoolers did better on a learning task when they listened to sounds that had nothing to do with the task, such as a recording of a children's song (see Figure 9-4). Other research (Higgins & Turnure, 1984; Humphrey, 1982) suggests that older, school-age children perform better on learning tasks when there are visual or auditory distracters present than when they are not present. These results suggest that even preschoolers are learning to hone their attention to relevant information even when distracting information is present. The Turning Points chart (p. 323) describes these and other advances in children's cognitive skills.

LEARNING TO ATTEND TO WHAT'S RELEVANT   To learn, the child must acquire the attentional strategy known as **selective attention**, in which the child focuses on the relevant aspects of the environment and ignores the irrelevant features. Shifts in selective attention are evident as early as 2 to 3 months of age. Whereas neonates may look longer at an object just because it is larger or brighter than another object, by 2 to 3 months of age, infants begin to select what to look at based more on the form or pattern of the information (Ruff & Rothbart, 1996). As children get older, the ability to attend selectively increases and enhances children's ability to learn (Richards & Anderson, 2004).

selective attention A strategy in which one focuses on some features of the environment and ignores others.

Research has shown that in the school years, children improve markedly in their ability to focus their attention on relevant information. In one study, investigators (Miller & Seier, 1994) gave children a study period in which they could open up any of the boxes in which objects had been placed to help them remember the location of the target objects (animals). There were pictures of cages on the doors to the boxes containing animals and pictures of houses on the doors to the boxes holding household objects (Figure 9-5). Older children (8-year-olds) focused on the first set of boxes and ignored the second set. However, the youngest children (3-year-olds) looked equally at both kinds of boxes during the study period. Modifying their attentional strategies paid off: The older children remembered more than the younger children. In short, older children use more selective search strategies, whereas younger children use more exhaustive methods.

As Figure 9-6 shows, the processing of relevant information increases steadily throughout the elementary and high school years. However, even preschoolers will use the relevance of items as a guide when they encode and process information (Blumberg et al., 2005). Processing irrelevant information, however, increases slightly until the age of 11 or 12 and then decreases rapidly. Overall, children show increasing efficiency in how they use attention in processing information.

Turning Points

SOME COGNITIVE ACHIEVEMENTS AS SEEN FROM THE INFORMATION-PROCESSING VIEW

1 YEAR
- Has limited attentional capacity; can attend to a toy for only a few seconds
- May have a rudimentary understanding of categories

2 YEARS
- Has increased attentional capacity; will spend more than 8 seconds with a single toy
- Can use external supports such as landmarks to find hidden toys
- May be able to use basic category labels to help remember things
- May be able to draw very simple analogies
- Relies on scripts of familiar events

3 YEARS
- Can use two rules in combination
- Often distracted by other things while watching TV but, when attention is fully engaged, may be quite attentive to a program
- May use analogies in solving a problem
- Understands relations between scale models and real objects

4 YEARS
- With a meaningful context and guidance in using simple strategies, can focus attention on relevant aspects of the environment and apply the information gained to a task
- Can combine two or more rules into a higher order rule
- Knows that long lists are harder to remember than short lists
- Understands that if you try harder on a more difficult task, you may succeed

5 YEARS
- Can memorize four units in a digit-span test
- Understands that thinking has content, that it is different from both perception and knowing, and that only people (and perhaps some other animate organisms) can think; can sometimes infer thinking in others if the evidence is strong

6 YEARS
- Begins to find audio content of TV programs as interesting as visual content
- With enough cues, may be able to plan a very effective strategy of attention

7 YEARS
- With training, may score as well on a test of recall as 12-year-olds

10 YEARS
- Becomes more selective in searching for information needed to make decisions

11 YEARS
- Begins to spend less time processing irrelevant information

12 YEARS
- Can memorize six or seven units in a digit-span test

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental changes.

Sources: Flavell et al., 1993b; Siegler, 1998.

ATTENTION AND PLANNING One of the reasons older children are better at using their attentional skills is that they are able to develop a plan of action to guide their attention as they solve problems. With development, the ability to attend selectively combines with **planning**, which is the deliberate organization of a sequence of actions oriented toward achieving a goal, and enables the child to solve increasingly more complex problems.

planning The deliberate organization of a sequence of actions oriented toward achieving a goal.
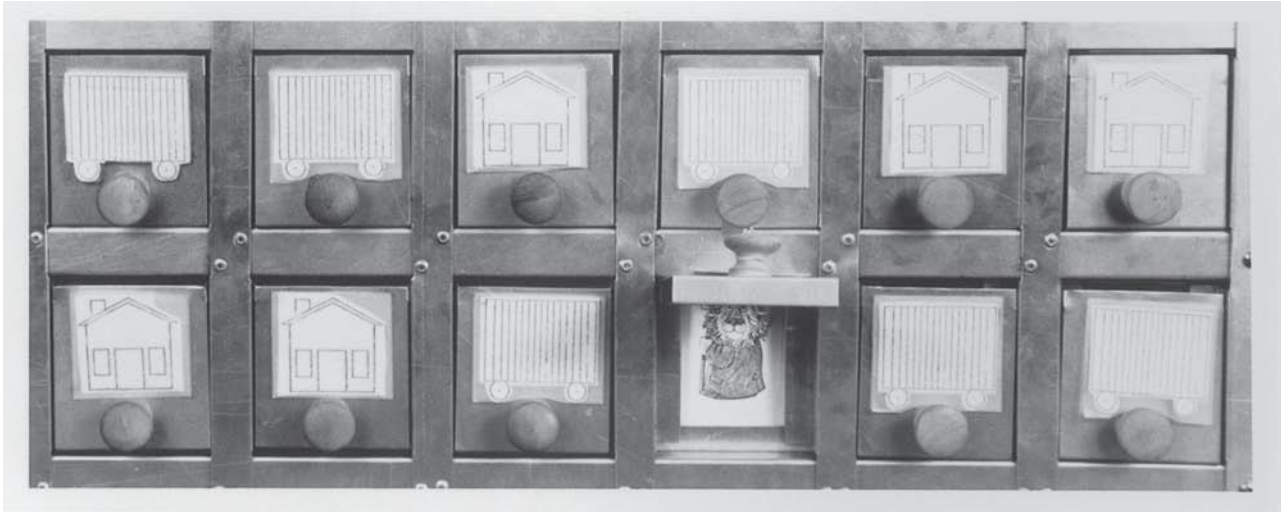
Figure 9-5

Paying attention to what's important

All the children in this study initially looked inside every box, finding pictures of animals in those with cages on their doors and pictures of household items in the boxes that displayed houses. When researchers asked 3-year-olds to recall where particular animals were, they opened house as well as cage doors, but 8-year-olds ignored the irrelevant house boxes and checked only the cage ones.

Source: Miller & Seier, 1994.

A classic study by Elaine Vurpillot (1968) illustrated the coordination of attention and planning using the drawings of houses presented in Figure 9-7. Suppose you were asked to determine whether each pair of houses was identical. How might you approach this problem? Probably, you would compare the six pairs of corresponding windows in each pair of houses until you found a pair of windows in which the objects displayed did not match. If all the pairs matched, you would conclude that the houses were identical. When Vurpillot administered this task to children, she found that younger children were far less likely than older children to use a systematic plan to get the necessary information. Filming the children's eye movements as they made their comparisons, she found that younger children tended to look at the windows randomly and even made judgments without ever looking at the windows that were different.

Should we conclude from this research that the young child is unable to plan an efficient use of her attention? Not necessarily. In a study with preschool-age children,

Figure 9-6

Children's changing attention to relevant and irrelevant information

Children steadily increase their attention to relevant information, but their concern with irrelevant information weakens and drops off quickly after junior high.
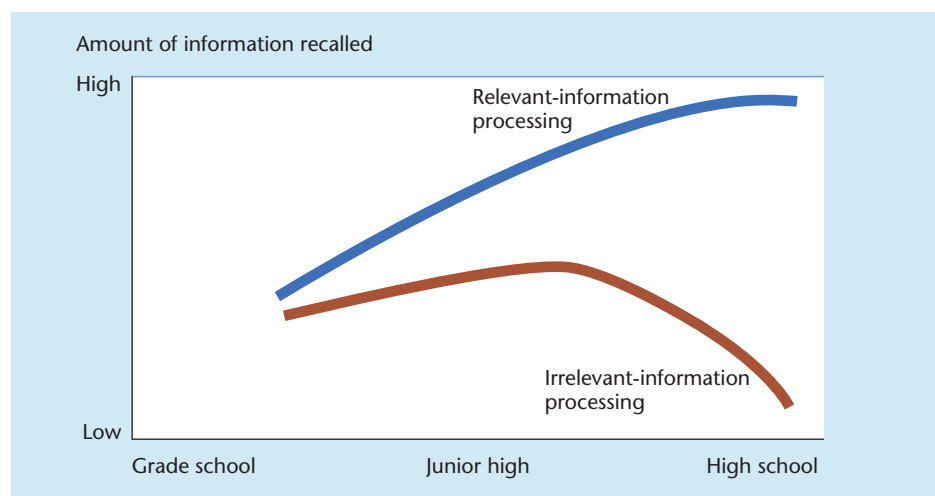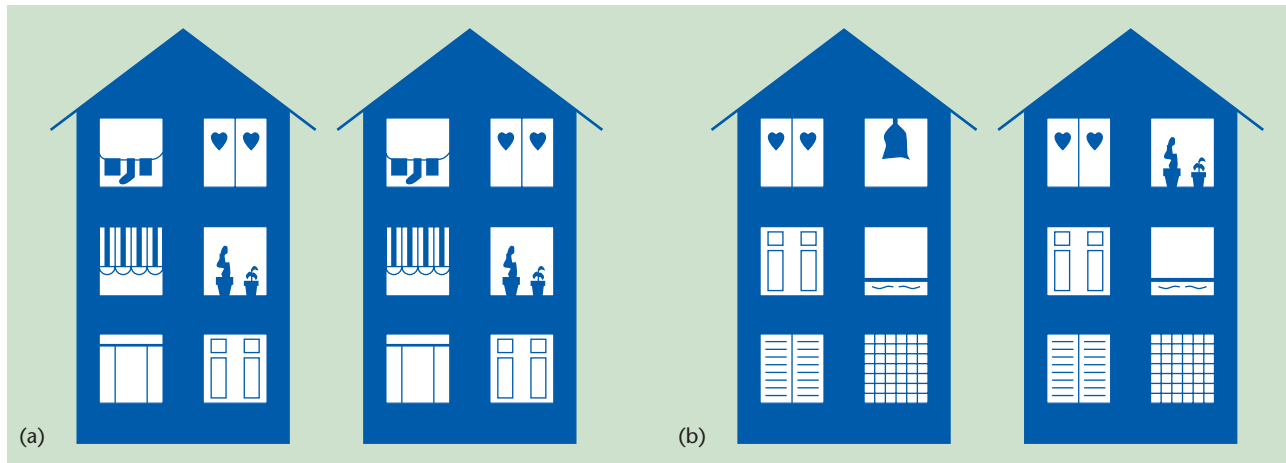
Figure 9-7

A test of children's ability to gather and filter information

How quickly can you perform a task given to young children—to determine which pairs of houses, either pair (a) or pair (b), are identical?

Source: Vurpillot, 1968.

Miller and Aloise-Young (1995) gave the children (ages 3 to 4) a task that required them to open doors to reveal two arrays of pictures and then to determine if the arrays were the same or different. When the task was embedded in an engaging story context, the children were able to attend to the appropriate contextual information and plan their solution more effectively. However, even in meaningful contexts, preschoolers can run into difficulty regulating their attention while they plan because they are less able to inhibit or suspend action during activity, a behavior that is critical to planning (Kochanska et al., 2000).

Planning is often done in social situations and, as we saw in Chapter 8, Vygotsky's theory considers social and cognitive development as closely linked. To explore social contributions to the development of planning, Gauvain and Rogoff (1989) used a model grocery store to compare the planning behaviors of 5- and 9-year-olds working with a peer, an adult, or alone. The older children were better at organizing their attentional resources and planning ahead, and children who planned in advance of action devised more efficient routes. Children were more likely to use attentional strategies and plan efficiently when they worked with a peer or adult partner, especially when the partners shared task responsibility. Sharing responsibility for carrying out a task helps children understand the problem from the perspective of another person. Learning about the thinking of another appears to enhance the child's own understanding of the problem.

Memory

Memory is one of the most extensively studied topics in cognitive development. An interest in human memory and how it develops is not surprising if one considers what memory is. Everything you know you remember in some way. Thus, the terms *memory* and *knowledge* are interchangeable. Acts of memory range from rapid-fire, basic processes, such as face recognition, to the recall of complex knowledge systems and events, such as the rules of chess and how a family coped with a tragic event.

There are several different types of memory (Schneider & Bjorkland, 1998). As we have discussed, short-term, or working, memory is the conscious area of memory. Long-term memory is where we store knowledge that we retain for long periods of time. Long-term memory includes a vast array of information. It includes all the world

semantic memory All the world knowledge and facts a person possesses.

episodic memory Memory for specific events, often autobiographical in nature.

knowledge and facts a person possesses, which is called **semantic memory**. It also includes knowledge of specific events, or **episodic memory** (Bauer, 2006). Much of the latter is autobiographical in nature, for it includes memories of important events or experiences that have happened to an individual. Later, we discuss the development of autobiographical memory, which has been the topic of much recent research.

The act of remembering can be either intentional or unintentional. Much of everyday experience involves unintentional forms of remembering. It is rarely necessary to exert effort to recall such things as language (e.g., vocabulary) and behavioral routines (e.g., how to get ready for school in the morning). In contrast, intentional memory, also called *explicit memory*, requires effort to store and retrieve. Much of the research on memory development focuses on the strategies children use to remember information intentionally such as rehearsal, organization, and elaboration. The three areas of memory that improve with development are (a) basic capacities, (b) strategies that enhance memory, and (c) world knowledge. We discuss each of these aspects in turn.

BASIC CAPACITIES   Basic memory capacities include the amount of information that can be held in short-term memory, referred to as memory span; the efficiency of memory processing; and the speed of this processing. Research has shown that these basic capacities, in particular, processing efficiency and processing speed, are related to each other and have an impact on the effectiveness of working memory (Demetriou et al., 2002).

memory span The amount of information one can hold in short-term memory.

Memory Span   Suppose you are asked to repeat a sequence of numbers beginning with three digits and then progressively more numbers are added. Eventually, you will be unable to repeat all the numbers correctly, for the sequence will have exceeded your **memory span** for this kind of information. The amount of information that a person can keep in short-term memory at any one time is limited, but the limit changes with development. For example, memory for a series of numbers (digit span) is about eight units for college students, six or seven units for 12-year-olds, and four units for 5-year-olds (Brener, 1940; Starr, 1923). Several explanations have been proposed regarding this age-related change. Some argue that it represents a change in capacity; that is, the actual amount of information than can be held in short-term memory increases with development (Pascual-Leone, 1989). Others argue that there is no solid evidence for a capacity change as children develop (e.g., Dempster, 1985) and that young children can remember more items from lists of items that interest them (e.g., toys). Such findings demonstrate that interest or motivation plays a role in memory span, and capacity changes may not be necessary to explain changes associated with age (Lindberg, 1980).

If this child is dialing a telephone number from memory, she is probably demonstrating a greater memory span than is common among children her age.

Another explanation for older children's and adults' greater memory span is that they use one or more strategies that help them organize such information in a way that facilitates remembering it (Chi, 1976). In particular, the older person may "chunk" the information into smaller, more easily remembered groups of numbers (Miller, 1956). Thus, whereas the young child may not be able to remember the sequence 1 4 9 2 1 7 7 6 1 8 1 2 because it is too long, the adult can recall the sequence because she chunks the numbers into meaningful groups: 1492, 1776, 1812. Notice that world knowledge, which increases with age, enables this ability to chunk.

Processing Efficiency   The first time a child uses a memory strategy, such as chunking, it takes up a fair

amount of space in working memory. However, with practice, some memory processing becomes automatic, and as a result, space in working memory becomes available to work on other problems or strategies. Case (1996) proposes that one of the important developmental changes in basic memory capacities is that the memory system simply gets more efficient.

Case (1985) attributes the child's increasing efficiency to two factors: streamlining of executive control structures (e.g., as the result of strategies, such as chunking and automatization) and biological maturation, such as changes in the myelination of nerves. Recall from Chapter 5 that as the child grows, the process of myelination coats the axons of neurons in such a way as to increase the efficiency of neuronal firing and, presumably, the efficiency of brain function. Although Case's position on the role of biological maturation in cognitive development has yet to be fully tested (Siegler & Alibali, 2005), his emphasis on the role of increasing efficiency in the use of memory is consistent with research findings on memory development.

Processing Speed   Processing speed, which is often assessed by reaction time, is the time it takes an individual to carry out a given mental act, such as recognizing a stimulus or reading a word. Processing speed is connected with processing efficiency; the more efficient a process, the quicker it is. Kail (1991, 2000) has demonstrated that speed of processing increases linearly with age from childhood to early adulthood.

Developmental changes in processing speed are similar for tasks that are very different from one another, such as reading comprehension, mental addition, retrieving names from memory, and visual search (Kail, 1995). According to Kail, the fact that we see developmental changes in processing speeds in many different tasks with widely varying task components and requirements suggests that change in processing speed is a fundamental aspect of cognitive development. We also know that processing speed is not simply due to practice. With development, children increase the speed with which they accomplish tasks that they encounter regularly and those that they rarely encounter (and therefore have little opportunity to practice) (Kail, 1995; Miller & Vernon, 1997). Finally, Kail and Park (1994) found the same relation between processing speed and age in Korean children and American children, which suggests that this may be a universal developmental process.

MEMORY STRATEGIES   Memory strategies are deliberate procedures that help people carry out memory-related tasks. Because what can be held in short-term memory is limited, if we want to remember something that exceeds these limitations, it is critical to use some technique or strategy. The ability to store and retrieve information efficiently from long-term memory also relies on strategies. People use a wide range of strategies to remember. Some of these strategies involve external supports such as taking notes during lectures or writing down appointments on calendars. Other memory supports are internal or mental (e.g., repeating a person's name to yourself several times). Adults commonly use three memory strategies: rehearsal, organization, and elaboration. Developmentalists have studied these three strategies to determine when and how they emerge in childhood and what role they may play in enhancing children's memory.

Although researchers tend to study these strategies separately, children often use more than one strategy at a time (Schneider & Bjorkland, 1998; Siegler, 1996). Children's use of multiple strategies was demonstrated in a study by Coyle and Bjorkland (1997). They presented second-, third-, and fourth-grade children with sets of words (e.g., *house, pencil, carrot, bean, dog, book, cat, potato*) that could be organized into categories such as vegetables, animals, or school-related items. Although the number of strategies children used to organize the words increased with age (Figure 9-8), even second graders used a variety of strategies.

Rehearsal   One of the simplest memory strategies is to repeat the information to be remembered, either mentally or out loud. This is called **rehearsal**. Research has shown

rehearsal A memory strategy in which one repeats a number of times the information one wants to remember, either mentally or orally.

Figure 9-8

More strategies, more memory

In a memory task, the oldest children used more strategies and recalled more words. Quite a few of the youngest children used multiple strategies, but their recall was less accurate.

Source: Coyle & Bjorklund, 1997.

Mean number of trials

Legend: No strategies · 1 strategy · 2 strategies · 3 strategies · 4 strategies

Grade 2 · Grade 3 · Grade 4
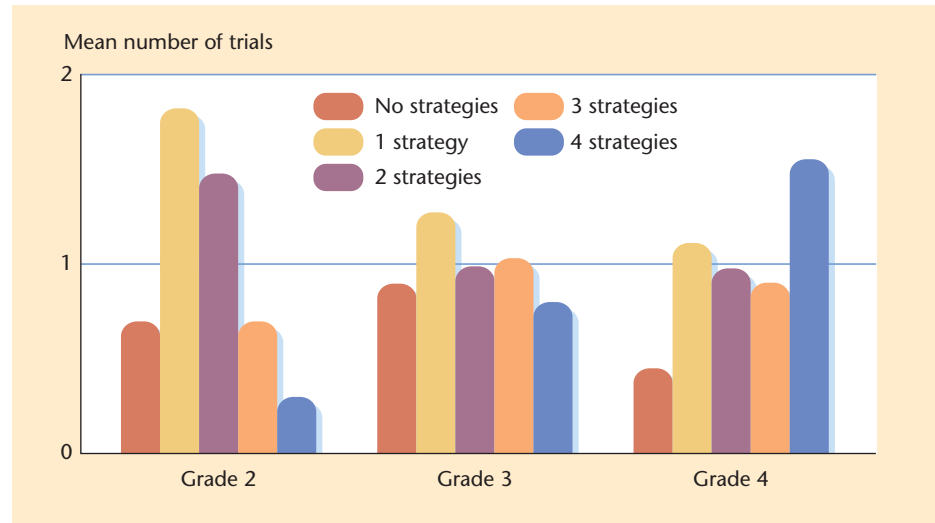
that the spontaneous use of rehearsal to aid memory increases with age (Flavell et al., 1966). Young children tend not to rehearse unless told to do so, and they are less efficient than older children when they do rehearse. For example, younger children will repeat the items to be remembered only once or twice when more repetitions are needed, and they are less likely to repeat earlier items (Naus, 1982). However, even young children can employ and benefit from rehearsal strategies if instructed to use them (Keeney et al., 1967).

In a classic study, John Flavell and his colleagues (1966) showed a series of pictures to a group of children ranging from kindergartners to fifth graders and asked them to recall the sequence in which an experimenter pointed to a subset of the pictures. Watching the children's lip movements for a sign that they were rehearsing by naming the pictures to themselves, the researchers found that the children who used spontaneous verbal rehearsal had better memory for the pictures. They also found that the use of such rehearsal increased dramatically with age. Whereas only about 10% of kindergarten children rehearsed the names of the objects in the pictures, more than 60% of second graders and over 85% of fifth graders did so. Later research by Ornstein, Naus, and Liberty (1975) modified this finding somewhat by showing that it was not the frequency of rehearsal that predicted performance differences in younger and older children. Rather, the style of rehearsal, which differs in younger and older children, explains the age differences in performance. Younger children are more likely to rehearse each item one at a time as it is presented to them. Older children are more likely to rehearse each item in a group with previously rehearsed items. It seems that the use of a more cumulative rehearsal strategy is more effective in aiding memory of items in a list. Although younger children can be trained to use a cumulative rehearsal strategy (Cox et al., 1989), older children are more likely to use this strategy spontaneously.

Organization   When we store information, we often organize it in a way that makes it more meaningful and thus easier to remember. How does the process of actively altering and rebuilding information change as children get older? An answer to this question is found in research on the use of the memory strategy known as **organization**, or the process of imposing an organization on the information to be remembered using categories and hierarchical relationships.

Over time, children make increasing use of organization to help them remember. The spontaneous use of organization to facilitate memory appears late in elementary school (Hasselhorn, 1992). By grade 4, most children use organizational strategies, such as categorizing and sorting (Bjorklund, 2005). Suppose we present a series of cards containing pictures of a *sweater, hat, apple, orange, jeans, sandwich, gloves,*

organization   A memory strategy that involves putting together in some organized form the information to be remembered; usually entails categorization and hierarchical relations.

coat, milk, and *dress* to children of different ages. Older children would be more likely than younger ones to form the cards into two groups of similar objects: *apple, orange, sandwich*, and *milk* as food items and *sweater, hat, jeans, gloves, coat*, and *dress* as items of clothing (Schneider & Bjorklund, 1998). Children who use this strategy are better able to recall the items in a subsequent test (Best, 1993; Best & Ornstein, 1986).

Are we to assume that young children are incapable of learning to use categorization? No, indeed. Children as young as 2 or 3 years old have been found to use basic category labels to help them remember (Waxman, Shipley, & Shepperson, 1991). Also, recall from Chapter 8 that assistance from more skilled people such as parents and teachers may enhance a child's cognitive performance. Researchers have been able to teach children as young as 7 to use organizational strategies like categorization. For example, Ackerman (1996) prompted 7- and 12-year-olds to categorize a set of words (e.g., *horse, pig, cow*) by asking them "Are all of these animals?" Older children generally recalled more than younger ones, but with training, 7-year-olds did as well as their older peers.

Finally, children's engagement in a task can also influence the use of this strategy. Guttentag (1995) presented third graders with pictures of common objects to be recalled (25 pictures in five categories) and used these measures to explore how active participation (being allowed to place the pictures themselves) related to children's use of an organizational strategy. Active participation led children to use the organizational strategy and thereby facilitated their recall.

Elaboration   The strategy of **elaboration** involves adding to the information we want to remember to make it more meaningful and thus easier to remember. This is a useful strategy because, although it might seem to add to the information burden, we are much more likely to remember something that is meaningful to us (Kee, 1994). The *Peanuts* cartoon in Figure 9-9 shows how Charlie Brown elaborates the numbers of his locker combination with major league players' numbers to provide a meaningful context for three seemingly random numbers. As with other strategies, children are more likely to use elaboration when they get older. However, even preschoolers can be instructed in elaboration strategies and how to use them to aid memory (Pressley & Hilden 2006).

Why Do Young Children Not Use Strategies?   Why do young children fail to use strategies to help them remember? There are three explanations as to why young children fail to use strategies that older children and adults find so useful. First, children may possess a **mediational deficiency**. This suggests that they simply can't make use of strategies to help them put information into long-term storage. The fact that children can be taught to use memory strategies effectively, however, makes this proposal seem unlikely.

A second explanation proposes that young children have a **production deficiency**. This suggests that although they may know certain strategies for remembering, they are unable to produce and use these strategies spontaneously. This raises the question of what young children do while they are trying to remember something. Although the strategies that young children use may not be the same strategies that older children and adults use, and although they are not always effective, they are nonetheless strategic acts by the child to remember. For example, DeLoache and Brown (1983) observed children as young as 18 months of age as they tried to remember the hiding place of a toy in their own home after a brief waiting period. Although some of the strategies children used aided memory, such as staring or pointing at the hiding location during the entire

Competing in a spelling bee usually requires a child to spend a lot of time rehearsing specific words and their spellings. And winning a prize can be a powerful motivator for using such cognitive strategies!

elaboration A memory strategy in which one adds to information to make it more meaningful and thus easier to remember.

mediational deficiency
Inability to use strategies to store information in long-term memory.

production deficiency
Inability to generate and use known memory strategies spontaneously.

Figure 9-9

Charlie Brown's elaboration strategy

Source: PEANUTS reprinted by permission of United Feature Syndicate, Inc.
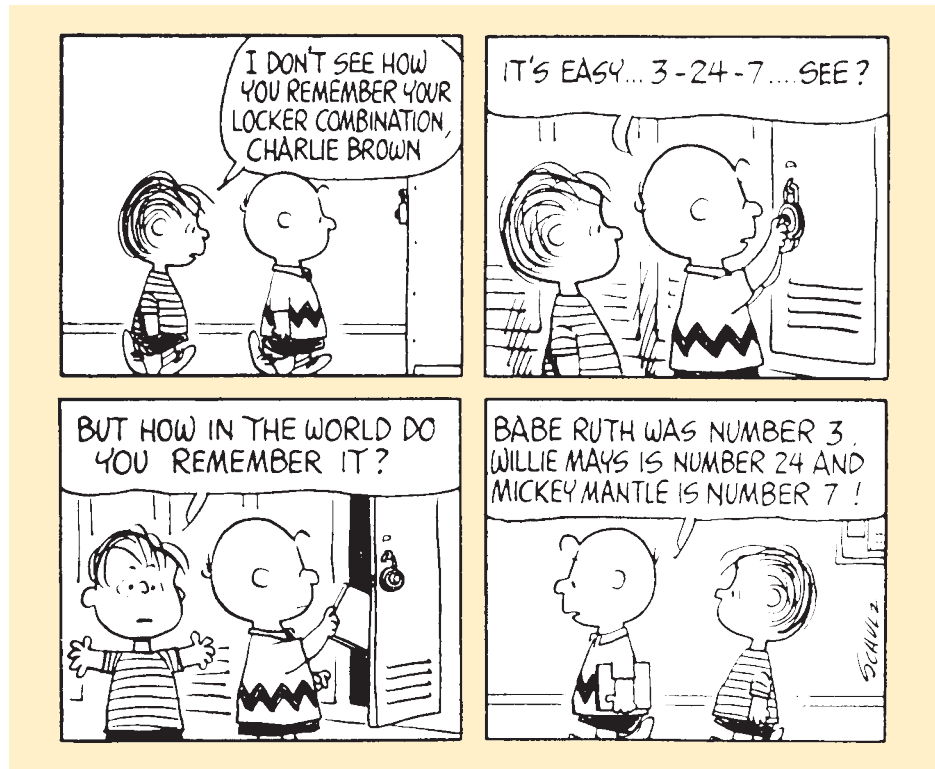
waiting period, others were less effective, such as repeating the name of the toy over and over with little or no attention to the hiding place. Thus, even young children can produce memory strategies spontaneously, but the complexity and effectiveness of their strategies are limited in comparison to the strategies of older children.

Finally, some researchers have suggested a third explanation—namely, that children have a **utilization deficiency** (Bjorklund et al., 1997; Miller, 1990; Miller & Seier, 1994). When they are in the early phases of strategy acquisition—for example, when learning how to rehearse—children may produce an appropriate strategy spontaneously but be unable to profit from using it. To illustrate, in one study, 9- and 10-year-old children were trained in the use of organizational memory strategies for remembering items in a list, such as sorting items into categories (Bjorklund et al., 1994). Later, when tested on their memory for the items, the children showed that they had retained the strategies they had been taught in the training session. However, despite the use of these strategies, their memory for the items decreased. In other words, they used the strategies, but the strategies did not facilitate their memory of the items.

Children's ability to benefit from memory strategies may reflect a trade-off between the costs and benefits of using the strategy (Miller et al., 1991). When a strategy is new and, therefore, a less practiced skill—as is often the case for younger children—using the strategy may consume much mental effort. Therefore, children may opt sometimes not to use it or to use it only haphazardly. As children become more adept at strategy use, the costs decrease while the benefits increase. Thus, with practice, children learn to use a new strategy to aid memory (Coyle & Bjorklund, 1997).

KNOWLEDGE OF THE WORLD   What children know about the world in general influences what they understand about a present event and what they will remember about it later. We saw an example of the effects of **world knowledge** on children's memory in our discussion of Michelene Chi's work with child chess experts and adult novices. Chi and others have further documented the differing cognitive performances of novices and experts, suggesting the important role that the knowledge base plays in memory (Bedard & Chi, 1992; Chase & Simon, 1973; Chi, 1978; Chi & Koeske, 1983).

utilization deficiency
Inability to use a known memory strategy or to benefit from the use of such a memory strategy.

world knowledge What a child has learned from experience and knows about the world in general.

Children obtain knowledge of the world in many ways: through their own experiences, through formal and informal instruction, and via information they obtain from their society and family. This knowledge also influences their memory abilities. Research based on Vygotsky's sociocultural view of development has focused on society's role in children's use of memory strategies and their memory performance (Gauvain, 2001b). Unfortunately, a great deal of cross-cultural research investigating children's memory processes has applied experimental techniques commonly used in Western society to non-Western populations. As a result, children in non-Western communities, who are less familiar with these techniques, often perform poorly on them (Cole, 1996; Rogoff, 2003). However, when memory tasks draw on children's knowledge base, for example, when they are presented in culturally familiar contexts, children in non-Western cultures perform as well as, or better than, children tested in the United States.

Meaningfulness and Goals   Rogoff and Waddell (1982) presented 9-year-old Mayan children in Guatemala and 9-year-old U.S. children with a memory task. The children watched as 20 familiar objects were placed into a model of a town that contained familiar landmarks (each model was appropriate to the culture of the group being tested). These objects were placed in their appropriate locations—for example, boats on lakes and furniture in houses. The objects were then removed from the display, and after a short delay, the children were asked to re-create the display they had seen prepared. Rogoff and Waddell found that the Mayan children performed slightly better than the U.S. children.

What led to the Mayan children's advantage? Rogoff (2003) speculates that the performance of the American children was hampered by the fact that about a third tried to use the strategy of rehearsal. However, this strategy, which is often taught in U.S. schools, is best suited to memorizing unrelated lists of objects; it may be only minimally effective in this spatial reconstruction task. In contrast to the U.S. children, the Mayan children appeared to rely on visual memory; they used the spatial relationships of the objects to organize their memories, which seems to have enhanced their performance.

In another study designed to explore how the goal of the activity affects children's memory, researchers (Mistry et al., 2001; Rogoff & Mistry, 1990) enlisted the help of the parents of a group of 4-year-olds. In the "lab" condition, parents presented their children with 10 pictures of lunch-related items such as cheese, bread, juice, and a napkin. After repeating the names of all 10 items, they asked the children to go to the experimenter at the other side of the room and tell her all the items they remembered. In the "lunch" condition, parents told the children that they were making a sack lunch and needed to get the ingredients from the "grocer" (played by the experimenter). The parents showed the child the pictures of the 10 items, and the child then went to the grocer and asked for the items. On average, children in the lab condition remembered only 2.7 items, whereas children in the lunch condition remembered 5.3 items. It seems that a clear and meaningful goal for the activity is important to children's remembering.

These findings echo Vygotsky's (1978a) view that memory in everyday life occurs in the course of meaningful, goal-directed activities. In other words, to remember something in and of itself is rarely our goal. Instead, we usually remember something so that we can do something else. For example, we remember the items on a list so that we can assemble them for an event, like a meal. Oftentimes, when memory is tested in laboratory situations, remembering in and of itself is the goal of the activity. Therefore, children who have more experience with activities in which memory alone functions as a goal, which is frequent in school settings, do better on such tasks than children who have less experience with school. But when a laboratory task is designed to resemble a more everyday type of memory activity—one in which remembering is used to carry out a meaningful, goal-directed activity—the difference in memory performance between children who have much versus little experience with school is reduced or eliminated.

Despite the likelihood that a meaningful activity will improve memory performance, there are some situations in which a meaningful, goal-directed activity may not elicit optimal remembering in children. Consider the question of children's reliability

BOX 9-1
Child Psychology in Action

SHOULD YOUNG CHILDREN TESTIFY IN COURT?

How accurate are children when asked to give testimony in a court of law? Research has indicated that suggestions by others, especially adults, may strongly influence a young child's reporting of past events (Bruck et al., 2006). Several investigators have explored this issue by having children listen to brief stories and then following up the presentation by introducing inaccurate information (e.g., Ceci et al., 1987; Doris, 1991; Ornstein et al., 1992). In general, these researchers have concluded that young children are more often affected by inaccurate information than older children are.

Ceci and his colleagues (Bruck & Ceci, 1999; Ceci & Bruck, 1998; Ceci et al., 1998) undertook an extensive series of studies to explore these effects of suggestion on children's memory. In one study, the experimenters engaged preschool children in a game similar to Simon Says. A month later, an interviewer talked with each child about the activity. In one condition of the experiment, the interviewer was accurately informed about what happened during the activity, and in the other, the interviewer was given false information. When the interviewer was accurately informed, the children's recall was 93% accurate. However, when she was misinformed, 34% of children 3 to 4 years old and 18% of children 5 to 6 years old corroborated false statements about what had happened during the experiment itself. The experimenters concluded that the younger the child, the more likely she was to be influenced by false information.

On the premise that children testifying in sexual abuse cases are often exposed to statements such as "X is bad" or "X did bad things," these investigators designed another study to test the effects of such information on children's memories of an event (Leichtman & Ceci, 1995). In the first condition of this study, a stranger named "Sam Stone" spent 2 minutes with 3- to 6-year-old children at their day-care center. On four later occasions, an interviewer asked the children about Sam's visit, trying to elicit as much detail as possible but taking care not to ask questions that would suggest answers. On a fifth occasion, a new interviewer elicited the same information and then asked specifically about two events that had not occurred during Sam's visit. Only 10% of the youngest children confirmed that these events had occurred, and of these, 5% said they had not actually seen or heard these events. Only 2.5% insisted on confirming the events when challenged.

In this study's second condition, starting a month before Sam's visit, the experimenters told children specific stories about how clumsy Sam was. After Sam had visited with the children, during which time he showed none of the behaviors that had been described, the children were again interviewed four times. This time, however, on each occasion, the interviewer stated a number of untruths about Sam, such as that he ripped a book during his visit and marked a teddy bear up with a crayon. On a fifth occasion, a new interviewer asked the children for a free narra-

as witnesses in the courtroom. Often, the cases in which children serve as witnesses involve domestic conflict or, worse, domestic and/or child abuse that is sometimes of a sexual nature. Although these situations are highly meaningful to children, as Box 9-1 suggests, other factors such as the influence of inaccurate suggestions by others and repeated questions may undermine memory performance (Eisen et al., 2002).

Knowledge of the Self: Autobiographical Memory   Here is how Ben, a 5-year-old boy, explained to his teacher how his 2.5-year-old brother Graeme sustained a bloody, but minor, cut to the head.

Teacher: What did you do over the holidays?

Ben: There was an accident.

Teacher: Oh, what happened?

Ben: My brother jumped on the bed and cut his head on the table. And then, after he cut his head, then the paramedics came and two fire trucks and an ambulance.

tive about Sam's visit. Among the youngest children, 72% reported seeing Sam perform one or more of the misdeeds they'd been told about after the fact. When the interviewer asked if they had actually seen Sam do these things, the percentage dropped to 44. Even when challenged, however, 21% maintained that they had seen these events.

Regardless of whether children's testimony is accurate or has been altered by suggestions from others, a jury's perception of a child witness is usually not favorable. Both laypeople and legal scholars believe that children make poor witnesses (Yarmey & Jones, 1983), considering them inferior to adults in recall memory. In one study, mock jurors believed that children under 11 could not provide accurate testimony (Leippe & Romanczyk, 1989). Paradoxically, these same adults believed that children make more *honest* witnesses than adults!

As yet, we have an uncertain picture of the child's ability to give an accurate account of past events (Saywitz & Lyons, 2002). As in the case of many other cognitive functions, a variety of factors affect recall. For example, an interviewer who is intimidating and forceful may well affect children's accuracy, but a kind and supportive interviewer may elicit accurate information from a child (Goodman et al., 1991). In addition, research has found that when a child has been an active participant in a situation, rather than a spectator, she is less likely to be susceptible to others' misleading suggestions (Lindberg et al., 2001; Rudy

& Goodman, 1991). The type of question asked, and whether and how it is repeated, may also affect children's responses (Lyons, 2002).

Current research has moved beyond description to focus on the mechanisms that may account for children's ability to recall events accurately. Some cognitive mechanisms include strength of memory, semantic knowledge, knowledge of scripts, and linguistic comprehension. For instance, Ricci and Beal (1998) showed that children who were more accurate in their original memory of an event were less likely to answer inaccurately when a question was repeated. Also playing a role are socioemotional factors, such as avoiding punishment or embarrassment, keeping promises made to others, eschewing personal gain if it involves being deceitful, and personality characteristics. As we have repeatedly noted, cognitive and social factors operate together in accounting for the kinds of effects we have discussed here. Finally, this work reminds us that the lines between basic and applied research are often blurred. Although the research reviewed tells us about children's testimony, it also informs us about children's cognitive and social development.

Teacher: Oh, how awful! Then what happened?

Ben: Mommy went with him to the hospital in the ambulance. I stayed home with Nana.

In this example, an adult, the child's teacher, elicited details that brought out more information about the event from the child's memory. She also defined an emotional context and steered the child along as he recounted the story. The child used the occasion to describe the aspects of the event that were important and understandable to him. He used the **narrative form**, an account of an event that is temporally sequenced and conveys meaning (Bruner, 1990). In his narrative, he described the event as well as information about himself, his family, and his own experience during the event. Even though what Ben said is brief, he makes it clear that this was an emotionally arousing experience for him. Even a short narrative may have deep meaning or value for a child (Engel, 1995). This value is enhanced because memories such as this one are personal in an interesting way: They define an individual's own history. Because there are often social contributions to these memories as children discuss them with others, this history

narrative form A temporally sequenced account that conveys meaning about an event.

is shaped by other people who inform the child about what aspects of his memory are interesting or important to remember. Since the event in this example garnered interest and attention from an adult, it may increase the likelihood of Ben's retelling the story and therefore rehearsing it, which will help him remember the event. Even the interpretations of others regarding an event may become part of the memory if the retelling triggers a certain response. For instance, if a child describes an experience that adults find amusing, the event may then be remembered not only in terms of the actions and the sequences of these actions but also in terms of its effect on others.

autobiographical memory
A collection of memories of things that have happened to a person at a specific time or place.

A person's memories about things that happened to her at a specific time or place are part of the person's **autobiographical memory** (Bauer, 2006). Autobiographical memory emerges in the early years of life, when a child is about 2.5 years old, and it develops substantially over the preschool years (Nelson & Fivush, 2004). Autobiographical memories are linked in both process and content to children's social experiences (Fivush et al., 2006). Researchers estimate that during family interaction, discussion of past events occurs as often as five to seven times an hour (Fivush et al., 1996). Parents talk directly to children about the past. Parents also talk to each other about the past in the presence of their children. Early in the child's life, shared memories are mostly one-sided, with the parent taking on much of the responsibility for reminiscing. But by the age of 3, children's contributions increase, and their memories begin to endure rather well. In fact, children as young as 3 years of age can remember specific event information over a fairly long time period (Fivush & Hamond, 1989).

Shared conversations about the past also help children have better memory for the event (Haden et al., 2001). The fact that these conversations typically tie these memories to something of personal significance helps children acquire knowledge about themselves, other people, and the world in which they live (Engel & Li, 2004). This type of personal storytelling or shared reminiscence is not unique to particular families or cultures. This practice is culturally widespread and helps to communicate cultural values to children. Psychologists have observed interesting cultural variations in these conversations. Wang (2004) asked preschool and early school-age children from China and the United States to recount four autobiographical events. She found that the memories of the American children included lots of personal details that emphasized the child's own experiences and feelings. In contrast, the Chinese children recalled memories that concentrated on social aspects of their lives, such as social interactions and daily routines. These patterns are consistent with different emphases on autonomy and social connections and with the parenting styles in these two cultural communities, which have been studied by Ruth Chao and are discussed in Chapter 12.

During social interaction, children learn much about what to remember, how to formulate their memories, and how to retain them in a retrievable form (Bauer, 2006). These conversations also help children learn how to cope with difficult or emotional experiences such as an asthma attack or a hurricane or other environmental disaster (Fivush & Sales, 2004).

Such shared memory experiences carry much import in young children's lives (Nelson, 2007). They contribute to the development of the self and thereby help create what Nelson (1996) calls the historical self. They also contribute to the cultural self in that shared memories reflect the values and practices of the culture in which development occurs. Finally, they give children the opportunity to rehearse these memories and, in so doing, to learn some very important things about the process of remembering.

Problem Solving and Reasoning

problem solving The identification of a goal and of steps to reach that goal.

Every day, people try to achieve many and varied goals. Some of these are modest, such as having a good breakfast. Some are grand, such as completing a long project at school or work. To reach these goals, people organize their actions in ways that are directed toward meeting their goals. **Problem solving** is the process of identifying an

action goal and delineating steps or means to reach this goal. Problem solving is a central feature of human intelligence. In fact, some psychologists equate problem solving with thinking. An important feature of problem solving is overcoming obstacles that interfere with reaching the goal. Thus, problem solving usually involves a goal and one or more obstacles that need to be overcome to reach this goal.

During children's development, their problem-solving abilities become more sophisticated; the strategies they possess become better developed, and they acquire new strategies (Garton, 2004; Klahr, 2000). To illustrate the impact these changes have on children's problem-solving abilities, we examine development in four areas of problem solving: solving problems by using rules that guide thinking; solving problems by analogy, or using information from one problem to solve another; using cognitive tools, such as the structure of routine behaviors or forms of representation, to solve problems; and solving problems by deductive reasoning. We also discuss another type of reasoning that plays an important role in cognitive development and problem solving: numerical reasoning.

RULE-BASED PROBLEM SOLVING   Some types of problems are solved by applying rules that describe the properties or elements of the problem. An interesting aspect of the development of problem-solving skills is that children learn the various rules to solve problems at different points in childhood. This is because the rules often vary in complexity, so younger children understand and apply the simpler rules of the problem, whereas older children understand and apply the more complex rules. This developmental change lends itself well to observational analysis of the development of skills in rule-based problem solving, and Robert Siegler (1983, 1991) has conducted research examining this development. This research uses the balance-scale task developed by Inhelder and Piaget (1958) in which there is a balance beam with weights on either side of the fulcrum. Children are asked to predict which way a balance with different weights placed at different distances from the fulcrum will tilt when supports holding up the arms of the beam are released. As you can see from Figure 9-10, what makes this a difficult problem is the need to consider two dimensions at the same time: both the number of weights on each side of the balance's fulcrum and the distance from the fulcrum at which each set of weights lies. Based on their observations of children of different ages, researchers (Klahr & Siegler, 1978; van Rijn et al., 2003) have described four rules that children apply at various points in development as they go about solving the problem.

Rule I: The side with more weights is heavier.

Rule II: If weights on both sides are equal, the side whose weights are farther from the fulcrum is heavier.

Rule III: If one side has more weights but the other's weights are farther from the fulcrum, you have to guess at the answer.

Rule IV: Weights $\times$ distance from fulcrum equals *torque*; the side with greater torque is heavier.

Siegler (1976, 1981) found that 3-year-olds did not use rules at all; about half of 4-year-olds used rule I, and all 5-year-olds used rule I. Among 9-year-olds, about half used rule II and half used rule III, and 13- and 17-year-olds almost always used rule III. Interestingly, although rule IV embodies the reasoning Piaget attributed to the child in the period of formal operations, only a minority even of college students used it! When Siegler analyzed the task carefully to try to discover why young children couldn't solve many of the balance-scale problems, he hypothesized that perhaps limited memory and/or lack of knowledge was at fault. When he allowed children to continue viewing the original balance arrangement (low memory demand) and gave them direct, detailed, and repeated instructions (knowledge), those as young as 5 were often able to solve the problems. In this case, social support or scaffolding, as research based on Vygotsky's ideas would predict, led to better task performance (Gauvain, 2001b).

Percent of Correct Answers
Expected When Each Rule Is Used

	Rule I	Rule II	Rule III	Rule IV
1.	100	100	100	100
2.	100	100	100	100
3.	0 (Will say *balance*)	100	100	100
4.	100	100	33 (Chance responding)	100
5.	0 (Will say *right down*)	0 (Will say *right down*)	33 (Chance responding)	100
6.	0 (Will say *right down*)	0 (Will say *right down*)	33 (Chance responding)	100
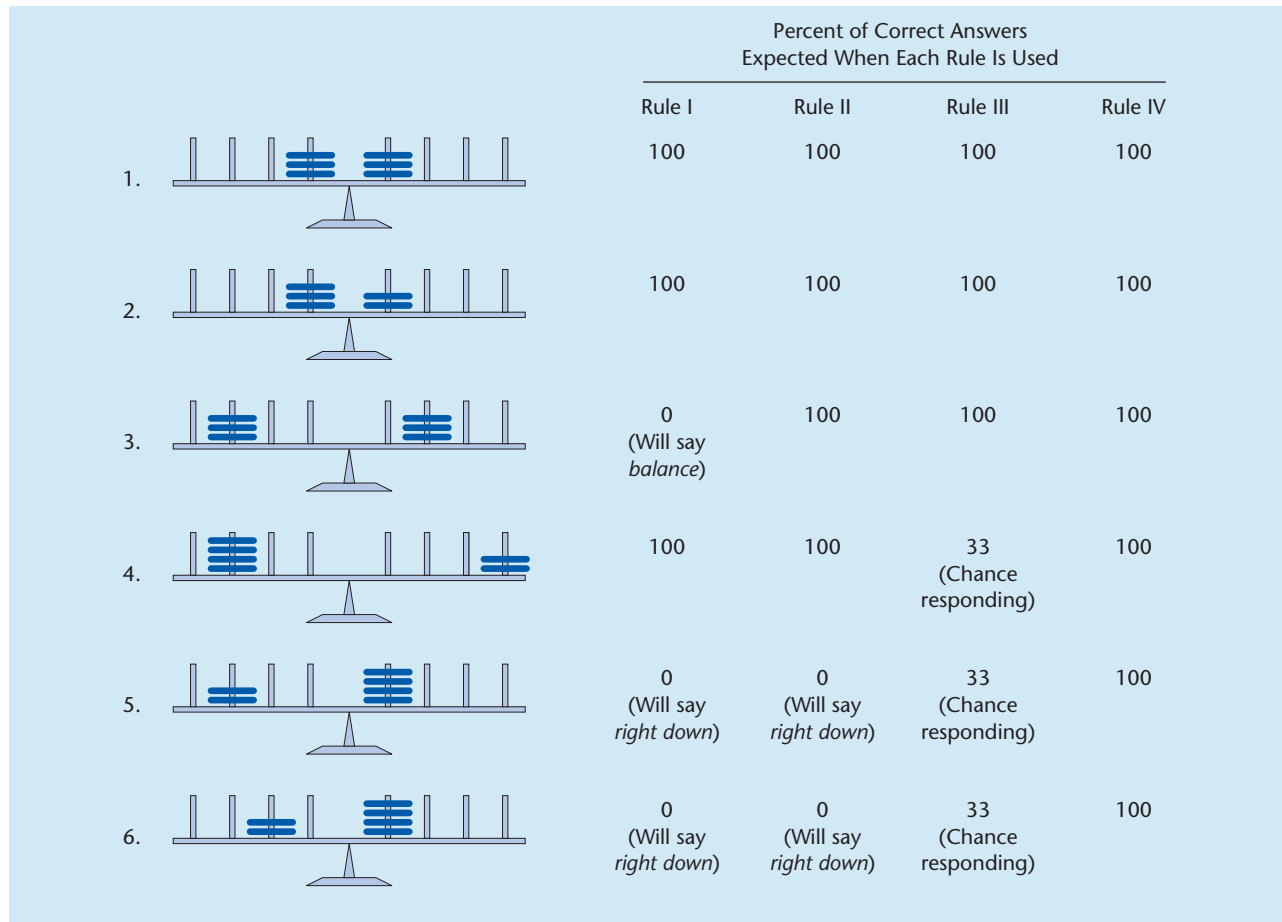
Figure 9-10

Balance-scale problems and strategies for solving them

Using Robert Siegler's rule IV will get you the correct answers on all these problems. Interestingly, your next best chance to get as many correct answers as possible is to use rule II. Why? Answers to all problems appear below the figure, upside down.

Problems 1 and 6: balance; problems 2–5: left down.

To understand the development of rule-based problem solving, it is important to notice that these rules are increasingly sophisticated in terms of how much information about the problem is considered in making a judgment about whether the beam will balance. Siegler's observations tell us that children are increasingly able with age to understand and apply these rules in solving this problem. It is important to appreciate that children are seeing and working with the same problem and that what distinguishes their approach to solving it is how children interpret or make sense of the problem. Not surprisingly, researchers have found that children use the more sophisticated rules as they get older. Although this general developmental pattern is consistent with other research in which older children perform better than younger children, what is important about this research is that it describes cognitive development in the area of problem solving as a logical and rule-based process of growth. As a result, it has interesting and important implications for understanding the development of children's problem solving in a wide range of everyday and more schoollike and scientific problems (Klahr, 2000).

Siegler (1996) and Siegler and Chen (2002) have extended this view by pointing out that not only do children have rule-based reasoning, but they also have a variety of

Piaget believed that children had to reach the stage of formal operations before they could solve complex problems such as measuring and calculating relative weights. Later researchers, among them Robert Siegler, have found that if younger children have enough information, they may be able to solve such problems.

strategies for solving problems at any given time. To solve a problem, children choose from the strategies they have available. What is important developmentally is the kinds of strategy choices available at a particular point in development, how children decide which strategy or strategies to use, and the effectiveness with which children use these strategies during problem solving. Siegler (1996, 2006) calls this process an adaptive strategy choice approach to problem solving and learning because, with development, the child makes strategy choices that are an increasingly better fit, or adapted, to the task at hand.

SOLVING PROBLEMS BY ANALOGY   Suppose you are trying to learn how to use a personal computer and are having difficulty understanding how all the directories and files are organized. In this situation, drawing an analogy between the workings of the computer and that of an office filing system may be helpful. The computer can be thought of as the filing cabinet, and files are the documents inserted in the drawers of the cabinet.

The use of *analogy*—or the inference that if two or more objects or situations resemble each other in some respects, they are likely to resemble each other in other respects—is a powerful problem-solving strategy (Holyoak, 2005). In an analogy, there is one situation that is more familiar and one that is less familiar. When individuals use an analogy to help them solve a problem, they draw an inference between the *source analog*, or the familiar situation, and the *target analog*, or the unfamiliar situation (Gentner & Holyoak, 1997). Sometimes, children and even adults find it difficult either to think of or to make use of analogies (Gick & Holyoak, 1980). One reason may be that when analogies are presented in the classic form of A:B as C:? (e.g., "foot is to leg as arm is to what?"), the important relations that need to be evaluated in the analogy may be unclear.

However, when simpler relations are used, even infants are able to use them to solve a problem (Goswami, 2001). For instance, Chen, Sanchez, and Campbell (1997) showed that 13-month-olds can use the perceptual similarity of different tools, such as boxes, cloths, and strings, to pull toys closer to play with them. Using perceptual similarity is a very simple type of analogical reasoning, however—recognizing deeper relations across two pairs of objects is more difficult. Research has shown that young children can demonstrate reasoning involving deeper relations provided the relational information is clear and little distracting information is present (Richland et al., 2006). For instance, in a study with preschoolers, pictures were used to represent the A, B, and C terms of the analogy—for example, chocolate (A):melted chocolate (B) as snowman (C):? (Goswami & Brown, 1990). The investigator would then show children five picture choices, one of which was of a melted snowman, and children would be asked to

choose the picture that best represented the answer (D). Three-year-olds were correct 52% of the time on these types of problems, 4-year-olds were correct 89% of the time, and 5-year-olds were correct 99% of the time.

Analogical reasoning may play an important role in knowledge acquisition in that it helps the child broaden and deepen his understanding of the relations between objects and across similar types of objects. Researchers have found that even though children do not often generate analogies on their own, cognitive support from another person can lead a child into identifying and using an analogy in an effective way to solve problems (Chen & Daehler, 1989). This has important implications for education. The type of relations that occurs in analogical reasoning seems particularly beneficial for learning subjects like mathematics, which require the application of abstract principles across similar problems (Novick & Bassok, 2005). In a cross-cultural analysis of eighth-grade mathematics lessons in Hong Kong, Japan, and the United States, Richland, Zur, and Holyoak (2007) found that teachers often include relational comparisons in their lessons, and the most effective lessons included cognitive supports such as the vividness of the relational comparison that is being used. Although teachers in the three countries presented analogies at similar rates, teachers in Hong Kong and Japan provided more cognitive supports for students in using this relational information than teachers in the United States did. These investigators suggest that one way to strengthen mathematics education in the United States, especially in junior high school when many youth lose interest in the subject, is for teachers to provide more cognitive support in their lessons that include analogies.

USING COGNITIVE TOOLS TO SOLVE PROBLEMS   If we had to figure out, entirely on our own, what to do in every situation that is repeated day after day (e.g., bathing, dressing, and eating meals) and to find our way to school, work, and other familiar places, we would have little time or energy to devote to new events and activities. Society provides us with cognitive tools that can be used to support intelligent action. Cognitive tools can be symbolic, like numerals, or material, like maps. Over the course of childhood, children learn to use these tools to help them solve problems. Psychologists refer to these types of external aids as cognitive tools because they function in the same way that a tool like a hammer does when you try to build something. A tool is an extension of your action (Lockman, 2000). It enables you to carry out an activity that you could not carry out in the same way or at all without the use of the tool. Sociocultural psychologists are particularly interested in the understanding and use of cognitive tools because such tools are products of a culture, they mediate cognitive activity, and they are passed on to children socially through the efforts of more experienced members of the culture (Olson & Cole, 2006; Sternberg & Preiss, 2005).

To illustrate the important role that cognitive tools play in intellectual development, we concentrate on three particular tools: scripts, cognitive maps, and symbolic representations. We use these three types of cognitive tools to show how important such tools are to cognitive functioning and its development.

Scripts   One way that people deal with everyday situations is by forming scripts for many routine events and activities. **Scripts** provide basic outlines of what one can expect in a particular situation and what one should do in that situation (Nelson, 1993; Schank & Abelson, 1977).

Even infants and toddlers learn to organize their representations of routine events such as bathing and feeding along scriptlike lines (Bauer & Wewerka, 1997). Bauer and her colleagues (Bauer, 2002; Bauer & Dow, 1994; Bauer & Mandler, 1992) have shown that by the end of the first year, infants use temporal information in recalling events. For example, these researchers presented infants with a familiar sequence, such as giving a teddy bear a bath (*put teddy in the tub, "wash" teddy with a sponge, "dry" teddy with the towel*). Not only were infants able to reproduce the familiar sequence with a high degree of accuracy, but they were able to do this with novel events as well (*make a*

script A mental representation of an event or situation of daily life, including the order in which things are expected to happen and how one should behave in that event or situation.

rocking horse move with a magnet). This research suggests that the central aspect of the script—that is, the ability to represent events in temporal order—is learned very early in life (Bauer et al., 2000).

One of the ways researchers have demonstrated early understanding of scripts is to observe what a child does when a routine event is changed and thereby violates the expectations of the script. Even very young children find such changes confusing and disconcerting (Bauer & Wewerka, 1997). In fact, young children are more rigid in their applications of scripts than older children and adults (Wimmer, 1980). For example, when asked to recall stories, young children will eliminate inconsistent elements of a story to preserve the expected sequence of events or to add events that they were expecting to happen but that did not (Fivush et al., 1996; Myles-Worsley et al., 1986). Moreover, if you present 20-month-olds with an incorrect sequence (e.g., *dry, wash, put teddy bear in tub*), they sometimes correct the order to the real-life script (*wash* before *dry*). When the order of a well-understood script is violated, toddlers often say, "That's so silly."

This child's script of how to get ready in the morning will help him remember all the different things he has to do at this time of day and the order in which he should do them.

In addition to organizing behavior, what other roles might scripts play in cognitive development? Scripts help children remember over a long period of time. In one instance, kindergarten children visited a museum, a special event for youngsters. Not only did the children develop and remember a general museum script when questioned 6 weeks and even 1 year later, but they were able to remember details of their own museum visit at these times as well (Fivush et al., 1984). The children could distinguish the general from the personal script, and the general script appeared to help them remember personal experiences by providing a way to organize their personally specific memories.

Scripts also function as a cognitive tool by freeing up space in the information-processing system so that an individual can pay attention to new or unexpected information that might come up within the course of a routine activity. As such, scripts function as a tool that helps to organize children's memory and expectations of events, and over the course of development, they are increasingly part of the information that guides children's behavior.

Cognitive Maps   Just as children need to be able to negotiate their way through routine events, so too they must find their way through the spatial environment. Spatial cognition—that is, the processing of visual information and spatial relations—is critical to human functioning (Newcombe & Huttenlocher, 2003). Many cognitive tools have been devised to support spatial thinking, including maps, directions, and most recently, global positioning systems (GPSs). Children learn to use tools to aid their understanding and use of spatial information, and this capacity changes throughout childhood. For example, young children often interpret symbolic representations, such as the symbols used on maps, quite literally: They may assume that the outline of an airplane on a map means that there's a real airplane, rather than an airport, at that location (Downs & Liben, 1986). As children grow, they become better able to use this kind of information accurately to negotiate new surroundings (Liben, 1999; Uttal, 2000). Parents and other more experienced cultural members play important roles in helping children learn to use maps and other tools (Gauvain, 1993).

As children mature, they also become more skillful at constructing mental and physical maps of places they know (home, school, and neighborhood) and routes they have traveled. They do this with the aid of **cognitive maps** (Tolman, 1948), which are mental representations of the spatial relations within a physical or geographic place—

cognitive map A mental representation of the spatial layout of a physical or geographic place.

Step 1	Using landmark knowledge	Children use landmarks, such as the yellow house or the red fire hydrant, to help orient themselves in space.
Step 2	Using route knowledge	Children can integrate several landmarks (e.g., yellow house, red hydrant, and blue mailbox) into a sequence that forms a route through space that leads unfailingly to the baseball field or the nearby store.
Step 3	Developing mental maps	Children can create an overall mental or cognitive map of a familiar area that incorporates landmarks and routes learned earlier.

for example, a room, a playground, or a town. According to Siegel and his colleagues (Anooshian & Siegel, 1985; Siegel & White, 1975), children develop the ability to form cognitive maps in three steps (see Table 9-2). First, they learn to recognize specific landmarks, acquiring *landmark knowledge*. Next, they put several landmarks together to form *route knowledge*. Finally, children acquire the ability to combine routes into an understanding of the spatial relations, referred to as a cognitive or *mental map*.

Landmark learning emerges early in life. On simple tasks, 3-year-old children can use landmarks to search for an object (Newcombe et al., 1998). Over childhood, children get better at identifying and using landmarks. Cornell and colleagues (2001) observed children between 6 and 12 years of age as they traveled through the environments around their homes where they were allowed to travel on their own, referred to as their *home range*. The experimenters observed the visual scanning that children used during their travel in the home range along with the distance and the duration of these walks. The researchers undertook this study because of a request from the police in Edmonton, Canada, who wanted information about how children move about in their home range. They thought this knowledge would help them in searching for a lost or missing child. They especially wanted to know how children of different ages travel around their neighborhoods when they are on their own (see Figure 9-11). When children get lost, their ability to find their way home may depend on the visual scanning they do while they walk, how far they travel, and how long they are willing to walk.

Cornell and his colleagues (2001) found that the distance and length of time a child would travel on his own increased significantly from 6 to 12 years of age. As children get older, they are more likely to try new routes and to travel beyond the limits of where their parents expect them to travel. Older children scan the environment more than younger children as they travel, and they pay more attention to landmarks. In fact, 8-year-olds are quite knowledgeable about the landmarks in their home range, but this information is not as well integrated with way-finding information as it is for 12-year-olds. For example, 12-year-olds, but not 8-year-olds, will attend to the location of landmarks in relation to intersections and other choice points on their routes.

For children throughout the world, from early to middle childhood, the home range represented in children's cognitive maps expands considerably, and children often travel outside the areas their parents expect them to visit (Munroe, Munroe, & Brasher, 1985). Thus, the development of spatial skills that may facilitate children's way-finding is critical to children's ability to solve spatial problems and explore their environments safely and to adults' capacity to help their children when needed.

Symbolic Tools or Representations   According to Judy DeLoache (2004), the ability to use symbolic tools or representations, such as scale models and pictures, is a great aid in solving real-world problems. In her research on how children use models as representations of actual objects, DeLoache (1987) showed children who were 31 and 39 months old a furnished, normal-size living room and a miniature model of the

same room, complete with furniture. She also showed them a normal-size doll and a miniature version of the doll. She hid the tiny doll in the model room while the children watched and then asked the children to find the larger version of the doll in the life-size living room, explaining that it was hidden in the same place in that room as the miniature doll was hidden in the model room. Figure 9-12 shows these steps in another, similar study in which DeLoache used toy dogs instead of toy dolls.

The older children had no problem finding the doll, but the younger children could not do so, although by retrieving the miniature doll from the model room, they showed that they remembered where it had been hidden. DeLoache proposed that the problem for the younger children was their inability to form a *dual representation*. That is, they couldn't conceive of the model room both as an object in its own right and as a repre-sentation of the larger, real room. To test this hypothesis, DeLoache and her colleagues (DeLoache et al., 1997) presented two groups of children with different accounts of the hidden doll problem. Both groups saw the full-size room and the doll hidden in this room. The researchers then presented the model room to the first group and hid the min-iature doll. To the second group, however, they explained that "a shrinking machine" had shrunk the full-size room, and then the researchers revealed the small, model room. The 2.5-year-old children in this study had no difficulty finding the miniature doll in the "shrunken" room. DeLoache and her colleagues suggest that the shrunken room version of the task was easier for the children because it did not require them to understand that the small room stood for or represented the large room symbolically. Thus, the children in the second group did not need to understand the *relation* between two objects—the large and small rooms—as children in the first group did. Instead, children in the sec-ond group had only to recognize the room in its new, shrunken form.

(a) Hiding toy in model   (b) Finding toy dog in room   (c) Finding toy in model
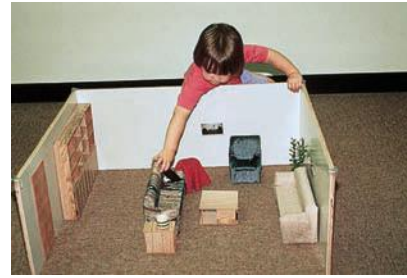
Figure 9-12

A room is a room but is it the same room?

In a classic series of experiments, Judy DeLoache has tested the ability of young children to conceive of a model room not only as a repre-sentation of a full-size room but as an object in itself. Here, DeLoache hides a small toy dog in a scale-model room while a 3-year-old child watches (a). The child retrieves a normal-size toy dog from the analogous place in the full-size room (b). The child retrieves the small toy dog from its hiding place in the scale-model room (c).

Source: Courtesy of Judy S. DeLoache, University of Illinois at Urbana–Champaign.

For DeLoache and colleagues (DeLoache et al., 1997; DeLoache & Smith, 1999), the notion that very young children may not be capable of dual representation has several practical implications. It may be that teaching basic mathematics concepts by using blocks of different sizes to represent different numerical quantities may present difficulty for very young children. Similarly, using anatomically correct dolls when interviewing young children about possible sexual abuse may not be as effective as psychologists have thought. Finally, there is substantial development in the preschool years in children's understanding and use of information represented in one symbolic form which is then presented or tested in another form—for example, viewing a video or a picture and then finding an object in a real space based on this information (Troseth et al., 2004). Experience with media, especially experiences that emphasize the connection between what is represented in the media and reality, helps even very young children use media as sources of information about the real world (DeLoache et al., 2004).

DEDUCTIVE REASONING   Piaget placed great emphasis on children's abil-ity to solve problems based on logical reasoning, such as conservation and class inclu-sion. These tasks rely on children's ability to use a form of logic called **deductive rea-soning**. When individuals use deductive reasoning, they come to a conclusion based on a set of premises or statements that have already been laid out. A syllogism is a type of deductive reasoning problem that includes a major premise, a minor premise, and a con-clusion: For example, All virtues are good. Kindness is a virtue. Therefore, kindness is good. Researchers have studied several types of deductive reasoning problems with children; we concentrate on three of these: propositional logic, transitive reasoning, and hierarchical categorization. Each of these types of reasoning makes important contribu-tions to mature thinking. However, as we shall see, they take a while to develop, and children often find problems based on deductive reasoning difficult.

deductive reasoning Logi-cal thinking that involves reaching a necessary and valid conclusion based on a set of premises.

Propositional Logic   In **propositional reasoning**, the logic of a statement is evalu-ated based on the information in the statement alone, as in a syllogism. For example, the Russian psychologist Alexander Luria (1976) tested the propositional reasoning of adults who had varying experiences with schooling and literacy by using the following syllogism:

propositional reasoning Logical thinking that involves evaluating a statement or series of statements based on the information in the state-ment alone.

> In the Far North, where there is snow, all bears are white.
>
> Novaya Zemlya is in the Far North and there is always snow there.
>
> What color are the bears there? (p. 108)

Piaget considered logical syllogisms such as this quite difficult and claimed that solving them required formal operational thinking. However, simpler versions of logical syllogisms were presented to 4- and 5-year-old children by Hawkins and her colleagues (1984). Here's an example of these syllogisms.

> Pogs wear blue boots.
>
> Tom is a pog.
>
> Does Tom wear blue boots? (p. 587)

The children in this study performed very well on these types of syllogisms—for example, by stating that Tom wears blue boots because he is a pog, which suggests that some of the basic skills needed for deductive reasoning of the type that is tapped in logical syllogisms may start to appear in the late preschool years.

Transitive Reasoning   One of Piaget's reasoning tasks involves **transitive inference**, or the mental arrangement of things along a quantitative dimension. This type of inference is important for understanding information that falls along an ordered sequence, such as which is faster than or heavier than something else. For instance, recall from Chapter 8 that children younger than 6 or 7 could not deduce that Melissa was taller than Fabiana when given the information "Melissa is taller than Zoe and Zoe is taller than Fabiana." Piaget attributed this failure to an inability to use the logic of transitive inference. An alternative hypothesis, proposed by Halford (2006), is that children do understand transitive inference but either use an incorrect strategy to solve this kind of problem or the memory load is too great, and therefore, it interferes with their performance. One strategy young children use is to assume that the most recently mentioned object is also the largest; in this case, the strategy leads them to an incorrect inference. Another strategy is to assume automatically that one of the given objects is longer than the others, regardless of what the experimenter actually said (Brainerd & Reyna, 1990). Both these strategies reduce the child's memory load but often lead to erroneous conclusions. Children often fail to remember and use information correctly in transitive inference tasks (Rabinowitz et al., 1994). However, when a transitive inference task is presented in a simple or familiar form—for example, when children are asked to arrange the Mama, Papa, and Baby Bears in the Goldilocks story in order of their size—even 4-year-old children do well (Goswami, 1995).

transitive inference The mental arrangement of things along a quantitative dimension.

Hierarchical Categorization   The organization of concepts into levels of abstraction that range from the specific (e.g., *dog*) to the general (e.g., *animal*) is called **hierarchical categorization**, or class inclusion. It is one thing to know that there are dogs and there are collies; a much more sophisticated understanding of categorization involves knowing that a collie is a kind of dog, such that all collies are dogs but not all dogs are collies. Some evidence suggests that even very young children are capable of forming categories based on hierarchical relationships (Haith & Benson, 1998; Mandler, 1998; Trabasso et al., 1978).

Mandler and Bauer (1988) studied 12-, 15-, and 20-month-old infants' knowledge of categories using a method called *sequential touching*, which takes advantage of young children's tendency to touch and manipulate objects within their grasp. These experimenters recorded the order in which an infant reached for objects that were placed, as a group, within the child's reach. Ensuring that the infants viewed objects from both specific levels (*dogs* and *cars*) and general levels (*animals* and *vehicles*), they presented a child with, say, two dogs and a horse or two cars and a truck and found that children touched sequentially objects that belonged to the same hierarchical category (e.g., all the dogs). This pattern of sequential touch was strongest at the specific level and present

hierarchical categorization The organization of concepts into levels of abstraction that range from the specific to the general.

BOX 9-2

Child Psychology in Action

IT'S EASIER TO COUNT IN CHINESE THAN IN ENGLISH

Chinese-speaking children may have an advantage over English-speaking children when it comes to counting. According to Kevin Miller and his colleagues (Miller et al., 1995), the Chinese language offers a more consistent "base-10" naming system than the system used in English. This may make it easier for young children to learn to count.

As Miller and associates point out, the base-10 Arabic system of numbering (1, 2, 3 . . . 10, 11, 12 . . ., etc.) is now used throughout the world, but *names* for numbers in different languages reflect older and sometimes more complex number systems. These researchers divided the number-naming systems of both (Mandarin) Chinese and English into four segments of interest: 1 to 10, 11 to 19, 20 to 99, and 100 and above. In the first segment, Chinese and English do not differ in difficulty of learning, they propose, for both languages require children to master an unordered sequence of names. There's no way to predict, for example, that *jiu* follows *ba* or that *nine* follows *eight*. In the second segment, however, Chinese follows a consistent base-10 rule (e.g., in Mandarin Chinese, the number 11 is called, literally, "ten-one"), whereas the English system is inconsistent and mixed: The names *eleven* and *twelve* seem to bear no relation to *one* and *two*, and the names for 13 through 19 both place unit values before the tens values and modify the names of both (*thir-teen, fif-teen*).

Between 20 and 99, both languages follow a base-10 approach in naming, but Chinese uses unmodified unit and tens names (e.g., "two-ten-four," for 24) whereas English modifies the first unit name—but not the second—and the tens names (e.g., *twenty-four*). Finally, above 100, the naming systems in both languages are

fairly consistent in using the base-10 format, with only a few exceptions.

Based on an early study in which they found some differences in mathematical skills favoring Chinese over U.S. children entering school for the first time, Miller and colleagues formulated several hypotheses. If these differences in fact reflected a more easily comprehended number-naming system, then (a) Chinese children should show substantial skills advantages after all children begin to learn to count above 10, (b) U.S. children should have more trouble with counting in the teens than Chinese children, and (c) differences should generally be related to the system of number names and not involve other aspects of counting. Engaging 99 Chinese children and 98 U.S. children—all between 3 and 6 years old—in a series of tasks that involved counting, these investigators confirmed their predictions. As you can see from Figure 9-13, there were no substantial differences between the two groups in counting up to 10, but as children began to count in the teens, a significant difference between Chinese and U.S. children emerged. This differential ability was evident until both groups began to count in the 100s, where they again performed similarly. Chinese children were somewhat more successful in counting actual displays of between 14 and 17 objects, but they did not differ from U.S. children in the ability to solve simple mathematical problems or to count arrays of 10 or fewer objects. Although this finding might seem to violate the researchers' third prediction, it is consistent with the notion that U.S. children will have the greatest difficulty with number naming with values in the teens.

to a lesser extent at more general levels. Thus, it appears that even infants have some knowledge of class-inclusion relations and, further, that they are able to use this information to form categories for familiar objects (Mandler, 1998; Quinn & Eimas, 1998).

Language development, especially names or labels for objects, contributes substantially to the ability of children to categorize objects hierarchically. Markman and Hutchinson (1984) gave 2- to 3-year-old children a set of three objects and asked them to sort the objects "where they belong," sometimes labeling objects and sometimes giving them no labels. When the experimenters did not label an object (e.g., a police car), the children put it with either a same physical category object (another car) or a same thematic category object (a police officer), apparently at random. When the experimenters did apply labels to objects, they used nonsense words rather than an object's real name. For example, they referred to the police car as a *daz*. Given this label, most of the
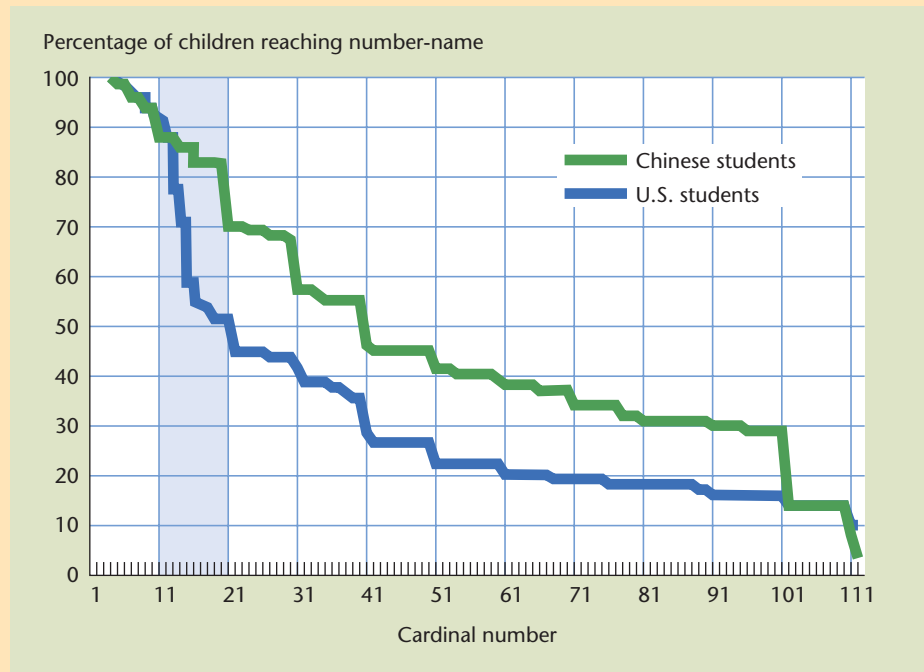
Figure 9-13

Counting in Chinese and English

The colored band at the left of the graph highlights the numerical teens (11–19) where Chinese and U.S. children begin to diverge in counting skills, possibly owing to the non-base-10 structure of English names for these numbers.

Given that neither the Chinese nor the English language is likely to change its number-naming system, how can we help American children acquire counting skills more efficiently and effectively? According to Miller and colleagues, obstacles that the English system presents can interfere with such mathematics operations as arithmetic carrying and borrowing. Other studies have suggested not only that Chinese children display more sophisticated addition strategies when they first enter school but also that counting strategies for certain kinds of problems predict adult performance on those problems. Although these researchers suggest that it may be important both to familiarize U.S. children with Arabic numerals at an earlier age and to emphasize use of the digits over the use of number words, they also point out that this approach might interfere with other methods used to teach American children the 10s-structured addition method. Perhaps the answer lies in both parents and teachers—in the Vygotskian style—encouraging children more to learn mathematics skills.

children placed the police car with another car, apparently seeing both as having the same category membership. Other researchers have replicated this effect (e.g., Mandler, 1998), and some have reported similar findings using Japanese words instead of nonsense syllables (Waxman & Gelman, 1986).

In summary, children's ability to form hierarchical categories is evident from a very young age. This ability, together with other deductive reasoning skills, contributes in significant ways to how children think and solve problems.

NUMERICAL REASONING The ability to think about and use numbers to reason and solve problems is an important developmental achievement that has significant implications for children's success at school (Geary, 2006b). Children begin to master some critical principles of counting at an astonishingly early age. Rochel Gelman

and Charles R. Gallistel (1978) have studied what preschool children do and do not understand about number systems. Based on their findings, they proposed five basic principles of counting that lead to children's competence with numbers.

1. **The one-one principle:** Each object should be counted once and only once.
2. **The stable-order principle:** Always assign the numbers in the same order.
3. **The cardinal principle:** A single number can be used to describe the total of a set.
4. **The abstraction principle:** The other principles apply to any set of objects.
5. **The order-irrelevance principle:** The order in which objects are counted is irrelevant.

A simple example will show these principles in action. Suppose we show a child 10 pennies, placed in a row, and ask her to count them. Pointing to each one, she proceeds to count them aloud, "1, 2, 3, 5, a, b, c, 10, 15, 12." When she finishes, we ask her to count them again, starting from the other end. Again she counts all 10 of the pennies, counting each one once and only once. "How many pennies are there?" we ask. "Twelve" she replies. We then ask her to count 10 marbles. She repeats: "1, 2, 3, 5, a, b, c, 10, 15, 12." Again, we ask, "How many?" "Twelve."

Can we say that this child understands counting? Based on the principles just outlined, the answer is yes. Despite her use of an unconventional number sequence, she does seem to understand the critical principles of counting. She assigned only one number to each of the objects and always assigned the numbers in the same order, showing that she understood the one-one and stable-order principles. She had no problem switching the order in which she counted the objects, nor did she mind counting both pennies and marbles, demonstrating her command of the order-irrelevance and abstraction principles. Finally, when asked how many objects there were, she replied "Twelve," showing that she understood the cardinal principle. Children may be competent in some or all of these principles at different points in their development. For example, a 3-year-old may grasp the one-one principle and the cardinal principle. However, he may be able to apply the stable-order principle only to sets with five or fewer members.

In addition to learning to count, many other abilities are important to numerical reasoning. These abilities include the conservation of number, first described by Piaget (1965) and discussed in Chapter 8. This is the understanding that the amount of a set remains the same despite superficial transformations—for example, understanding that moving a line of eight checkers closer together does not change the number of checkers in the line. Some research has shown that counting ability and conservation of number are related to one another. Saxe (1979) distinguished children, who ranged in age from 4 to 6 years, by their counting and number conservation abilities. Some children who had good counting skills were unable to conserve; however, all the children who could conserve number also had good counting skills. These results demonstrate that counting ability is a necessary but not a sufficient condition for the type of reasoning used in number conservation.

Researchers have studied when children develop skills in other areas of numerical and mathematical reasoning, including enumeration, number facts, arithmetic, word problems, and number relations (deCorte & Verschaffel, 2006). Evidence has also accumulated that Asian children display greater mathematical skills than American children do (Geary et al., 1992; Stevenson & Lee, 1990). Box 9-2 suggests that, as seen in Chinese and U.S. children, this difference may begin to emerge very early in life and may reflect verbal as well as quantitative abilities.

METACOGNITION

As cognitive beings, we don't just remember things, solve problems, and form concepts; we have an awareness of the strengths and limitations of our cognitive processing

and of the way we control or regulate it to achieve such mental feats. In other words, we know about knowing (Flavell et al., 1995b). These two components of **metacognition**—knowledge about knowing and control of cognitive functioning—are interrelated and act on each other (Brown, 1975). The child's understanding of her cognitive abilities and processes and of the task situation will influence the strategies she uses in her learning. In turn, her abilities and her experience in learning will contribute to her knowledge about cognition and to her success or failure on cognitive tasks. Consequently, metacognitive skills have significant implications for children's success in the classroom (Bransford et al., 1999).

There are a number of developmental changes in metacognition. The child's own awareness of how much he knows and is able to remember changes with age. Older children have a more realistic and accurate picture of their own and others' memory abilities than do younger children (Flavell, 1985; Flavell et al., 1970; Yussen & Berman, 1981). An older child recognizes, for example, that he doesn't learn well when tired or anxious.

In this section, we examine two important areas of research on metacognition: children's knowledge of tasks and their knowledge of specific strategies for learning and remembering. The development of a theory of mind, discussed in Chapter 8, is also directly related to metacognition. The limitations in young children's understanding of the mind that are related to the types of metacognitive abilities discussed here are listed in Table 9-3.

Knowledge About the Task

The ability to monitor one's comprehension is critical for a wide range of problem-solving and communication tasks. Do I understand the directions to get to the party tomorrow? Do I understand the instructions for this week's science project? To process information effectively, the child has to be sensitive to her present state of knowledge so that she can seek out the information she needs to further her understanding.

One way that children get information about their present state of understanding is by monitoring their task performance. To study this type of knowledge, Markman (1977, 1979) assessed children's ability to monitor their comprehension of task instructions. In one study, Markman (1977) gave first, second, and third graders inadequate

metacognition The individual's knowledge about knowing and his control of cognitive activities.

Young Children

- Underestimate the amount of thinking they and others do.
- Don't understand the concept of a "stream of consciousness."
- Fail to appreciate that someone sitting quietly and not obviously "doing" something might be engaging in mental activity.
- Don't understand that activities such as looking, listening, or reading involve thinking. When someone is engaged in such an activity, preschoolers do not automatically understand that the person's mind is active. Similarly, they don't recognize that *they* have been thinking when engaging in these kinds of activities.
- Cannot infer what another person might be thinking about, even when they realize the person is thinking.
- Fail to understand that when you focus attention on one thing, you are often not able to think about other things.
- Have difficulty saying, when asked, whether they were thinking or what they were thinking about, even when their responses are prompted and facilitated.
- Tend to understand thinking in terms of its products rather than in terms of the process of thinking itself.

Table 9-3

Limitations on young children's metacognition

Source: Flavell et al., 1995b.

instructions for playing a card game. The experimenter dealt each child four cards, which had letters on them, and explained the game.

> We each put our cards in a pile. We both turn over the top card in our pile. We look at cards to see who has the special card. Then we turn over the next card in our pile to see who has the special card this time. In the end, the person with the most cards wins the game. How would you like to try to play this game with these instructions?

The experimenter made no mention either of what the "special card" might be or of how one acquired more cards. The first graders were far less likely to realize the inadequacy of the instructions than the second and third graders, who asked for more instructions before attempting to play the game. One quarter of the first graders never asked a question, and most recognized that a problem existed only when they were asked to repeat the instructions or when they began to flounder in playing the game.

Another aspect of knowledge of a task is an understanding of task demands. Do children realize that some things are harder to learn than others? Apparently, yes. Even 4-year-olds know that a long list of objects is harder to remember than a very short list and that success on the harder task is more likely if one makes a greater effort (Wellman, 1978; Wellman et al., 1981). Many kindergartners and first graders know that it would be easier to relearn information (e.g., a list of birds) that one had forgotten than to learn it for the first time. Of course, younger children are not aware of some aspects of memory; for example, only older children appreciate that it is easier to retell a story in their own words than to repeat it verbatim, a realization that is relevant to children's courtroom testimony (Bruck et al., 2006; Kurtz & Borkowski, 1987).

Knowledge About Strategies

Children know a great deal more about using strategies to help in memorizing and solving problems than we might think. They seem particularly sensitive to the value of external aids to memory—for example, leaving your books where you will see them in the morning and writing notes to yourself. According to Lovett and Pillow (1995), even children who were not yet literate suggested the latter ploy! Children are also aware of the value of associations in memory (e.g., remembering your mother's age by adding 30 to your own) (Wellman, 1977). As children grow older, their understanding of what strategy is appropriate increases (O'Sullivan, 1996), and sometimes, they reveal a rather sophisticated understanding of memory strategies. When asked how she would remember a phone number, a third grader responded:

> "Say the number is 633-8854. Then what I'd do is—say that my number is 633, so I won't have to remember that, really. And then I would think, now I've got to remember 88. Now I'm 8 years old, so I can remember, say, my age two times. Then I say how old my brother is, and how old he was last year. And that's how I'd usually remember that phone number."
>
> "Is that how you would most often remember a phone number?" the experimenter asked.
>
> "Well, usually I write it down." (Kreutzer et al., 1975, p. 11)

How can we define the relationship between metacognition and performance on cognitive tasks? Unfortunately, this relationship is not straightforward (Miller & Weiss, 1981). Some situations, for example, are more likely to engage the child's metacognitive activity than others. Carr and Jessup (1995) found that first, second, and third graders who understood which strategy they were using employed some strategies more correctly when solving math problems. If children understand that a strategy like rehearsal is useful, do they actually use it in situations in which it would help them remember things? The answer is, not always. But it is important to remember that even adults don't always apply strategies they know to be effective in situations where they would be useful. It is unrealistic to expect children always to act at an optimal level of cognitive functioning when adults do not always do so.

Making the Connections 9

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 9 and discussions in other chapters of this book.

Chapter 9
Cognitive Development: The Information-Processing Approach

Attention skills in infancy are precursors of later attention deployment skills.
In Chapter 4, "Infancy: Sensation, Perception, and Learning," p. 123

The concept of cognitive tools (scripts, plans) is consistent with Vygotsky's sociocultural theory.
In Chapter 8, "Cognitive Development: Piaget and Vygotsky," p. 299

Appreciating cognitive information-processing strategies is useful in understanding peer acceptance and rejection.
In Chapter 12, "Expanding the Social World: Peers and Friends," pp. 445–447

SUMMARY

Information-Processing Theory

- The **information-processing approach** views the human mind as a system that processes information according to a set of logical rules and limitations analogous to those with which a computer is programmed. Research using this perspective tries to describe and explain changes in the processes and strategies that lead to greater cognitive competence as children develop.

- Several basic assumptions of information-processing approaches are present to some degree in all these views. These assumptions are that thinking is information processing, mechanisms of change are important to describe, the cognitive system is self-modifying, and careful task analysis will aid researchers in examining the information-processing system. One type of task analysis used in this perspective is **microgenetic analysis**, which examines how children solve problems in close detail.

- The **multistore model** of information processing proposes that information enters the system through the **sensory register** and is encoded and stored in either **short-term memory** or **long-term memory**. **Connectionist models** propose that memory is based on the interconnections of information

in neural networks in the brain. **Neo-Piagetian theories** attempt to apply information-processing ideas to explain Piaget's stage-related changes.

- The basic structures of the information-processing system do not change with development; instead, development occurs through changes in the speed and efficiency of the processes one applies to the information. Four cognitive processes considered to be important in development are **encoding** and **mental representation**, **strategies, automatization**, and **generalization**. Some theorists also posit an **executive control process** that monitors, selects, and organizes the various **cognitive processes** applied to information. In addition, knowledge plays a critical role in children's abilities to encode and represent information.

Developmental Changes in Some Significant Cognitive Abilities

- As children mature, they can control and focus their **attention** for longer periods. In addition, older children are better than younger children at **selective attention** whereby they modify their attention to fit task requirements. Older children also implement more systematic or deliberate plans

to focus their attention when gathering needed information, especially when **planning** a course of action, although younger children can make use of some attention-focusing strategies when these are provided to them.

- Memory development is studied extensively, both in terms of **semantic memory**, which includes all the knowledge and facts about the world a child has, and **episodic memory**, which includes memory for specific events. Our **memory span**, or the amount of information we can hold in short-term memory, improves between infancy and adulthood. Some researchers suggest that this is due to the development of increased capacity based on changes in the brain. Others suggest that the difference is due to greater efficiency in the cognitive system.

- The spontaneous use of verbal **rehearsal** as a memory strategy increases with age. Although even young children can use rehearsal as a strategy if instructed to do so, they typically fail to generalize the strategy to new tasks. Another strategy that improves with age is **organization**, in which children use categorization and hierarchical relations to process and store information. As with rehearsal, young children can successfully learn to use this strategy if instructed or reminded to do so.

- **Elaboration**—a strategy that involves adding to information to make it more meaningful and thus easier to remember—appears to aid children's retention. The fact that elaboration improves recall, despite the accompanying increase in informational load, underlines the importance of meaning in memory.

- Research suggests that the failure by young children to use strategies may result not so much from a **mediation deficiency** but from **production** and **utilization deficiencies**, which may in turn spring from an interaction between the costs and benefits of using a particular strategy. As children become more adept at strategy use, costs decrease and benefits increase.

- **World knowledge**, or what a person has learned about the world from past experiences, influences what the person will understand and remember about a present event. Evidence for the role of world knowledge comes from studies indicating that experts remember more than novices and that, when memory tasks are presented in culturally familiar contexts, children in Western and non-Western cultures perform equally well.

- One important application of developmental research on memory is in children's eyewitness tes-timony. Recent studies suggest that children may not be reliable witnesses because they are susceptible to suggestions by others. However, children are more resistant to misleading questions when an interviewer is supportive and when they have been actively involved in the recalled event.

- **Problem solving** involves a high level of information processing because it mobilizes perception, attention, and memory to reach a solution. Over development, rule-based problem solving changes as children use different and more complex rules to guide their problem solving on logical tasks. Although **analogy** is a powerful tool in problem solving, young children and even adults often have difficulty recognizing and using analogies. **Cognitive tools**, such as scripts, cognitive maps, and symbolic representations, aid thinking and with development, children increasingly use these tools to solve problems.

- **Scripts** of routine activities provide children with basic outlines of how events occur in many familiar situations; children as young as 3 know about and use scripts to guide their actions.

- Children also use **cognitive maps** to negotiate their way through and explore their surroundings. Very young children also develop the ability to understand and use **symbolic representations**, such as maps, models, and pictures, which represent objects or places in the real world.

- **Deductive reasoning** develops later in childhood, though simple versions of such tasks have shown some early evidence of **propositional reasoning, transitive inference**, and **hierarchical categorization**.

- Children's numerical reasoning reflects their developing competence with numbers, which includes five basic principles of counting that develop during the preschool years. Counting skills may to some degree reflect the number-naming system of a child's native language.

Metacognition

- **Metacognition** refers to the individual's knowledge and control of cognitive activities. Metacognitive knowledge, which develops over childhood, includes the child's knowledge about the self, his theory of mind, and his knowledge about the task and about specific strategies.

- Although young children understand how some features of a task may influence memory, even first graders are not good at monitoring their com-

prehension of information about a task. Young children are aware of the importance of memory strategies, and they are particularly sensitive to the use of external memory cues. However, older children have a more accurate and realistic view of their own memory abilities, and they are able to separate their own beliefs and desires from reality.

EXPLORE AND DISCUSS

1. When we reach 2.5 to 3 years of age and begin to use language rather effectively, we talk to other people quite a bit as we try to remember the events we have experienced. Do you think our early memories are actually memories of our own experiences and our reactions to them, or are they more like a social redefinition of these experiences? Explain your answer.

2. Given what you have read in this chapter about changes in thinking and problem-solving abilities in childhood, do you think it is a coincidence that formal schooling begins at around 6 to 7 years of age? Why or why not?

3. Research by DeLoache and her colleagues on changes in how children understand models has interesting implications for how young children understand many of the toys they play with. Think about some of children's favorite toys—for example, farm sets and model trains. What do you think very young children think about these types of toys, and how does their understanding of the toy change as they get older?

4. Child testimony is a very important and complex issue. What do you think might be the best way to interview a preschooler who is the only witness to a crime? Would you use a different interview approach if the child was 7 to 8 years of age? Why or why not?

Anonymous. *Wolfgang Amadeus Mozart as a child at the pianoforte*, 18th century.

Mozart House, Salzburg, Austria.

10.

Intelligence and Achievement

What do you think intelligence is? Psychologists studying this question asked a wide variety of people—including some of their colleagues—what behaviors they think are characteristic of intelligence (Sternberg et al., 1981). People generally agreed that three behaviors are central to intelligence: problem-solving ability, verbal ability, and social competence. How do these three behaviors fit in with the scientific definition of intelligence? In this chapter, we answer this question by describing how scientists define and measure intelligence. We also identify the biological and experiential factors that affect intelligence and its development and discuss how these factors may be modified to improve intelligent behavior.

In this third chapter on cognitive functioning, we take a slightly different approach to the topic of cognitive development. In Chapters 8 and 9, we were concerned with cognition in general, and we were more interested in similarities among people than in their differences. In this chapter, however, we want to know how individuals use their cognitive skills. To examine this, we look at individual intelligence and why people appear to differ in intelligence and cognitive achievements. We discuss such questions as: Are differences in intelligence caused by genetic factors, environmental influences, or both? Are these differences permanent, or can they be changed? We then consider the matter of achievement, examining various factors that affect children's performance on intelligence tests and in the schoolroom. Then, after considering the results of some interventions to improve cognitive functioning, we look at intellectual giftedness and mental retardation and conclude with some ideas about creativity in young children.

THEORIES OF INTELLIGENCE

In attempting to formulate useful theories of intelligence, scientists have focused on three main issues: whether intelligence is unitary or multifaceted, whether it is determined by genetic or environmental factors, and whether it predicts academic success and success outside school. The first of these questions, which was hotly debated in the early years of the twentieth century, asked whether intelligence is a single characteristic of a person that cuts across all behaviors or whether intelligence has many components and a person can be intelligent in some but not all of these components. Today, it is generally accepted that intelligence is multifaceted and that both genetic and environmental influences contribute to a person's intelligence. The argument is far from over, however, for now investigators concentrate on such issues as whether heredity is more influential than the environment or the other way around and the degree to which inherited factors that contribute to intelligence may be altered by environmental conditions.

The third question asks how important intelligence, as measured by IQ tests, is in predicting children's and adults' success in school and real-life situations. Is it useful in predicting academic success, job stability, and good health and adjustment? Throughout the chapter, we find answers to these and other questions, but we also raise more questions. Let's look now at several ways scientists have devised to understand what intelligence is.

The Factor Analytic Approach

factor analysis A statistical procedure used to determine which of a number of factors, or scores, are both closely related to each other and relatively independent of other groups of factors, or scores.

general factor (g) General mental ability involved in all cognitive tasks.

specific factors (s) Factors unique to particular cognitive tasks.

To many people, it may seem obvious that intelligence has many components. We all know we are better—or smarter—at some things than at others. Early investigators believed that intelligence is a unitary or single ability that affects everything a person does. To test this idea, researchers have performed **factor analysis** on intelligence test performances of large samples of people. This approach is a statistical procedure that can determine which of several factors, or scores, are closely related to one another without overlapping each other's contribution. An early researcher who used factor analysis, Charles Spearman (1927), proposed that intelligence is composed of a **general factor (g)** and a number of **specific factors (s)**. Spearman regarded g as general mental ability, which was involved in all cognitive tasks, and he saw s factors as unique to particular tasks. A person with a high g would be expected to do generally well on all tasks. Variations in her performance on different tasks could be attributed to the varying amounts of s factors she possesses.

This unitary concept of intelligence was challenged by Lewis Thurstone (1938), who proposed that seven primary skills comprise intelligence: verbal meaning, perceptual speed, reasoning, number, rote memory, word fluency, and spatial visualization. More recently, Carroll (1993, 1997) and other researchers (Johnson et al., 2004) have confirmed the existence of a general factor of cognitive ability. It seems that people who do well on one kind of cognitive test (e.g., reading comprehension) are indeed likely to do well on other such tests (e.g., listening comprehension or folding paper into specific shapes, as in Japanese *origami*). However, individuals still vary in their competence across different domains, such as vocabulary, basic mathematics skills, or the ability to discriminate musical pitch. In other words, children vary both in overall level of intellectual ability and in how skilled they are in specific aspects of cognitive functioning.

The Information-Processing Approach: Sternberg's Triarchic Theory

Information-processing researchers focus on the processes involved in intellectual activity. They argue that to understand intelligence, we must assess how individuals

use information-processing capabilities, such as memory and problem-solving skills, to carry out intelligent activities (Das, 2004).

Sternberg's (1985, 2001, 2005) **triarchic theory of intelligence** is an important example of this approach. As this theory's name implies, it proposes three major components of intelligence: information-processing skills, experience with a given task, and ability to tailor one's behavior to the demands of a particular context. These three components work together in organizing and guiding intelligent behavior. *Information-processing skills,* discussed in Chapter 9, are required to encode, store, and retrieve varying kinds of information. *Experience,* the second component of Sternberg's model, considers how much exposure and practice an individual has had with a particular intellectual task. For example, if two children perform similarly on a mathematics test of long division but one child has never studied this topic and the other child has studied it for several years, we would make different judgments about these children's relative intelligence based on their performance on the test (Sternberg et al., 1993).

Context, Sternberg's third component, recognizes that intelligence cannot be separated from the situation in which it is used. Because people must function effectively in many different contexts, they must be able both to adapt to the requirements of a situation and to select and arrange situations to meet their own abilities and needs (Sternberg, 1985). Thus, one dimension on which the intelligence of a particular behavior can be measured is its suitability and effectiveness in a particular setting (Ceci, 1996; Sternberg & Wagner, 1994). For example, consider how the young Brazilian street vendors we discussed in Chapter 8 were able to adapt their understanding of mathematics to the contexts in which they used these skills.

Recently, Sternberg expanded his triarchic theory into a theory of **successful intelligence**, which considers intelligence in relation to the ability of an individual to meet her own goals and those of her society (Sternberg, 2001). Successful intelligence requires three abilities: analytical, creative, and practical. *Analytical abilities* include those taught and tested in most schools and colleges, such as reasoning about the best answer to a test question. *Creative abilities* are involved in devising new ways of addressing issues and concerns. *Practical abilities* are used in everyday activities such as work, family life, and social and professional interactions. Much of practical knowledge we use is tacit. It is not explicitly formulated, and it is rarely taught directly to children; rather it is learned by observing others (Sternberg & Wagner, 1993). Nonetheless, this kind of practical, **tacit knowledge**, which is often referred to as common sense, is shared by many people and guides intelligent behavior (Cianciolo et al., 2006). Table 10-1 displays an example of a test item that Sternberg and his colleagues use to measure tacit knowledge in college study behavior. Sternberg (2001) found that tacit knowledge of this sort, though not associated with IQ score, predicted the salaries and job performance of adult workers.

Applications of Sternberg's triarchic theory to school curricula have shown success in helping children learn academic material (Grigorenko et al., 2006) and in helping adolescents improve their scores on college entrance examinations (Stemler et al.,

triarchic theory of intelligence A theory that proposes three major components of intelligence: information-processing skills, experience with a task, and ability to adapt to the demands of a context.

successful intelligence Ability to fit into, change, and choose environments that best fulfill one's own needs and desires as well as the demands of one's society and culture. Includes analytical, creative, and practical abilities.

tacit knowledge Implicit knowledge that is shared by many people and that guides behavior.

College Student Life

You are enrolled in a large introductory lecture course. Requirements consist of three exams and a final. Please indicate how characteristic (on a scale of 1 to 5, from least to most characteristic) it would be of your behavior to spend time doing each of the following if your goal were to receive an A in the course:

_____ Attend class regularly.

_____ Attend optional weekly review sections with the teaching fellow.

_____ Read assigned text chapters thoroughly.

_____ Take comprehensive class notes.

_____ Speak with the professor after class and during office hours.

Table 10-1

Tacit knowledge: A sample test question

Source: Adapted from Sternberg & Wagner, 1993.

2006). Moreover, children who were instructed with curricula based on the triarchic theory reported enjoying the material more than children taught the same information in a more traditional fashion. This research suggests that this approach to intelligence when applied in the class setting may benefit children's learning as well as enhance their motivation to learn.

Gardner's Theory of Multiple Intelligences

theory of multiple intelligences Gardner's multifactorial theory that proposes eight distinct types of intelligence.

Howard Gardner (2004) has proposed a **theory of multiple intelligences**. He suggests that human beings possess eight kinds of intelligence: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, intrapersonal, interpersonal, and naturalistic (see Table 10-2). He has also suggested a possible ninth form, which he called spirituality or existential intelligence (Gardner, 1999). Three of the types of intelligence—linguistic, logical-mathematical, and spatial—are similar to the kinds of abilities assessed in traditional intelligence tests. The remaining types have been much less widely studied, yet according to Gardner, they are equally important to human functioning. For example, interpersonal intelligence may be of crucial importance to a parent, a nurse, or a teacher; bodily-kinesthetic intelligence may greatly facilitate the performance of a dancer or an athlete.

Each type of intelligence is considered a unique form of intelligence with its own developmental path guided by its own forms of perception, learning, and memory (Connell et al., 2003). For example, linguistic intelligence emphasizes verbal and memory abilities and generally develops over years of educational experience, whereas bodily-kinesthetic intelligence, which emphasizes understanding of body mechanics and its coordination with perceptual abilities, may appear quite early in life and be less experience dependent. In addition, Gardner suggests, a single individual can display different combinations of these intelligences, and different cultures or periods of history may emphasize or value some of these forms of intelligence more than others. In this way,

Table 10-2   Gardner's theory of multiple intelligences

Type of Intelligence/Description	Examples
Linguistic: Sensitivity to word meanings; mastery of syntax; appreciation of the ways language can be used	Poet, teacher
Logical-mathematical: Understanding of objects, symbols, the actions that can be performed on them and the interrelations among these actions; ability to operate in the abstract and to identify problems and seek explanations	Mathematician, scientist
Spatial: Accurate perception of visual world; ability to transform perceptions and mentally re-create visual experience; sensitivity to tension, balance, and composition; ability to detect similar patterns	Artist, engineer, chess player
Musical: Sensitivity to musical tones and phrases; ability to combine tones and phrases into larger rhythms and structures; awareness of music's emotional aspects	Musician, composer
Bodily-kinesthetic: Skilled and graceful use of one's body for expressive or goal-directed purposes; ability to handle objects skillfully	Dancer, athlete, actor
Intrapersonal: Access to one's own feelings; ability to draw on one's emotions to guide and understand behavior	Novelist, psychotherapist, actor
Interpersonal: Ability to notice and distinguish among others' moods, temperaments, motives, and intentions; ability to act on this knowledge	Political or religious leader, parent, teacher, psychotherapist
Naturalist: Insight into the natural world; ability to identify different life forms and species and the relationships between them	Biologist, naturalist

Sources: Gardner, 1983, 1999; Torff & Gardner, 1999.

(a)

(b)

Building a model out of Tinkertoys, as this U.S. child is doing (a), illustrates Howard Gardner's spatial intelligence. Playing an indigenous flute, like this Quechan child from Peru (b), illustrates Gardner's musical intelligence.

Gardner's view of intelligence corresponds with the ideas presented in the domain-specific views of intelligence discussed by evolutionary psychologists (recall our discussion of evolutionary psychology in Chapter 1).

Gardner's theory has its critics, however. Some investigators have pointed out that Gardner's intelligences may not all be separate entities; that is, some may be closely tied to others, whereas others may be distinct (e.g., Carroll, 1993; Weinberg, 1989). Also, few efforts have been made to evaluate Gardner's theory rigorously using standard assessment techniques or to develop tests based directly on the theory (Benbow & Lubinski, 1996; Sternberg & Wagner, 1994).

These caveats aside, Gardner's theory has been used to improve public education (Kornhaber & Gardner, 2006). Most notably, Gardner's work with Harvard University's Project Zero has resulted in more individualized and varied instruction through use of different curricula aligned with his multiple intelligences. And Gardner, Sternberg, and their colleagues collaborated on the Practical Intelligence for Schools (PIFS) program, designed to teach the tacit knowledge needed to succeed in school. These programs have been shown to have positive effects on student motivation, achievement, and behavior (Gardner, 1999; Sternberg, 2001).

TESTING INTELLIGENCE

Although psychologists have become increasingly interested in the *processes* that contribute to intellectual functioning, the study and testing of intelligence have traditionally focused on its *products*—that is, on the specific knowledge and skills displayed on intelligence tests. On the basis of such tests, researchers have developed the **intelligence quotient (IQ)**, an index of the way a person performs on a standardized intelligence test relative to the way others her age perform. Although the term IQ is widely used, it is often misunderstood: Many people think IQ is innate and does not change. But research has shown that IQ *can* change over the life span, for it can be modified by experience.

In discussing intelligence and intelligence testing, it is important to remember that we can only *infer* intellectual capacity from the results of an IQ test. Although we assume that capacity and performance are related, we can measure only performance.

intelligence quotient (IQ) An index of the way a person performs on a standardized intelligence test relative to the way others her age perform.

Moreover, there is always some discrepancy or gap between capacity and performance owing to the particular circumstances of a performance, such as the precise construction of a test or the test taker's emotional state during the test. How we interpret or explain the gap ends up being crucial to our evaluations of our own and other people's intelligence, a topic we discuss later in the chapter when we consider achievement motivation (Dweck, 2000, 2006).

Why do we need to measure intelligence? There are three primary purposes in intelligence testing: predicting academic performance, predicting performance on the job, and assessing general adjustment and health (Flanagan & Harrison, 2005). The earliest intelligence tests were designed to meet the first of these goals, and most existing intelligence tests, such as the Binet and Wechsler scales, predict academic achievement quite well. Predicting how well a person will succeed at a job is the second goal of intelligence testing, and according to Gottfredson (1997), such measures are the most powerful predictors of overall work performance. A third use of intelligence testing is in assessing people's general adjustment and health. The Bayley, Stanford-Binet, and Wechsler tests that we discuss in this section can detect signs of neurological problems, mental retardation, and emotional distress in infants and children as well as adults.

Unfortunately, intelligence tests do not make predictions as accurately for some groups in our society as for others (Neisser et al., 1996). Many critics, for example, have pointed out that these tests often require knowledge that children with fewer advantages than others may not have. As a result, intelligence tests may unfairly classify some people or groups of people as less intelligent than they actually are. For some years now, researchers have been attempting to develop what are known as **culture-fair tests**—that is, tests that attempt to exclude or minimize the kind of experientially or culturally biased content in IQ tests that could prejudice test takers' responses. The Raven Progressive Matrices Test, which requires people to identify, distinguish, and match patterns of varying complexity, and the Kaufman test we discuss shortly are such tests.

We begin this section with a brief discussion of infant intelligence tests and then examine the two tests that are most widely used for testing IQ beyond the years of infancy—the Stanford-Binet tests and the Wechsler scales. Next we examine the relatively new Kaufman test, which attempts to measure the processes by which people acquire information and solve problems. We then turn to how intelligence tests are constructed, including the ways psychologists develop norms for test scoring and the kinds of procedures they use to ensure the validity and reliability of their tests. We conclude the section by considering the stability of intelligence as well as what factors may effect changes in intelligence over time.

Measuring Infant Intelligence

The **Bayley Scales of Infant Development**, or BSID (Bayley, 1969, 1993), are probably the best-known and most widely used of all infant development tests. Because these tests were designed to be used with the very young, they include many nonverbal test items chosen for their ability to measure specific developmental milestones. The Bayley scales are used with infants and children between 1 month and 3.5 years of age, and they are generally used to assess children suspected to be at risk for abnormal development. For example, the Bayley *mental* scale includes such things as looking for a hidden object and naming pictures, whereas the *motor* scale includes such items as grasping ability and jumping skills. Although these scales are useful in identifying infants at risk for unhealthy development, the Bayley scales and other older tests of infant intelligence are poor predictors of later cognitive levels. This may be because they rely primarily on sensorimotor measures.

Newer tests, such as the Fagan test, measure information-processing skills. The **Fagan Test of Infant Intelligence** assesses processes such as encoding the attributes of objects, seeing similarities and differences between objects, and forming and using mental representations (Fagan, 1992). You'll recall that in Chapter 4 we discussed habit-

culture-fair test A test that attempts to minimize cultural biases in content that might influence the test taker's responses.

Bayley Scales of Infant Development A set of nonverbal tests that measure specific developmental milestones and are generally used with children thought to be at risk for abnormal development.

Fagan Test of Infant Intelligence A test of how infants process information, including encoding attributes of objects and seeing similarities and differences across objects.

uation and the infant's tendency to pay attention to what is novel in his environment. Based on this notion, the Fagan test examines an infant's intelligence by measuring the amount of time the infant spends looking at a new object compared with the time he spends looking at a familiar object (Fagan et al., 1991). Using a set of 20 photographs of human faces, arranged in pairs, the examiner begins by showing a baby one photograph of the first pair for 20 seconds. Then the examiner pairs that photograph with its mate, showing the baby the two photos together for 5 seconds, and then again for another 5 seconds, this time reversing the two photos left to right (to avoid any tendency for the infant to "choose" one side). The score the infant receives is made up of the total time he spends looking at the novel photograph throughout a presentation of all 10 pairs. In research on whether infants from different cultures would be equally adept at this task, Fagan and his colleagues found that there were practically no differences between the average scores obtained by nearly 200 infants representing European Americans, African Americans, Bahrainians, and Ugandans, suggesting that the test is culture fair. Although this test predicts later cognitive development better than older tests, the correlations with later development remain weak to moderate (Sternberg et al., 2001; Tasbihsazan et al., 2003). However, infant tests are primarily used for diagnostic screening to determine a child's need for early intervention services.

The Stanford-Binet Test

The **Stanford-Binet Test** is the modern version of a test devised in the early 1900s by Binet and Simon to identify children who were unable to learn in traditional classroom settings and who would benefit from special education.

Stanford-Binet Test The modern version of the first major intelligence test; emphasizes verbal and mathematical skills.

Binet and Simon believed that intelligence was malleable and that children's academic performance could be improved with special programs (Binet, 1909/1973; Siegler, 1992). Critical of earlier psychologists who had tried to assess intelligence by measuring simple sensory or motor responses, Binet and Simon tested higher mental functions, such as comprehension, reasoning, and judgment, as well as skills taught in school, such as recalling details of a story. In addition, because they recognized that as children grow they become able to solve increasingly complex problems, they built into their test age-related changes in children's learning with the aim of tapping children's competence at different age levels.

Binet introduced the concept of **mental age**, which is an index of a child's actual performance compared with her true age. Thus, if a 6-year-old child gets as many items correct as the average 7-year-old, the 6-year-old's mental age is 7; that is, she performs as well as a child who is 7 years old. The mental age concept was later captured in the intelligence quotient, for which the German psychologist William Stern devised the following formula:

mental age An index of a child's actual performance on an intelligence test compared with his true age.

$$IQ = MA/CA \times 100$$

where IQ equals mental age (MA) divided by chronological age (CA), multiplied by 100. Thus, if a child's mental age equaled her chronological age, she would be performing like an average child her age, and her IQ would be 100. If her performance was better than other children her age, her IQ would be above 100. If it was inferior, her IQ would be less than 100.

Today's Stanford-Binet test is an updated version of the Binet-Simon test. It includes language and mathematics skills as well as other indexes of intelligent performance. The extent to which experience in school influences performance on this test is not entirely clear.

The Wechsler Scales

The **Wechsler Intelligence Scales**, developed by David Wechsler (1952, 1958), include the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), the Wechsler Intelligence

Wechsler Intelligence Scales Three intelligence tests for preschool children, school-age children, and adults that yield separate scores for verbal and performance IQ as well as a combined IQ score.

Scale for Children (WISC), and the Wechsler Adult Intelligence Scale (WAIS). These tests yield separate verbal and performance IQ scores as well as a combined, full-scale IQ score. The most recent update of the WISC, which is the fourth version (Wechsler, 2003), includes items related to how children process information such as memory, strategy use, and processing speed. Such items were added because they may be less influenced by experience with school or certain cultural or economic factors. The descriptions of the WISC subtests from this recent version are shown in Table 10-3.

Rather than use mental age as a basis for estimating intelligence, Wechsler created the **deviation IQ**, which like the Binet IQ takes 100 as an average score. The deviation IQ is based on extensive testing of people of different ages and on the statistical computation of mean scores for each age group. In computing these average scores, psychologists use a statistic called the *standard deviation* to identify the extent to which nonaverage scores deviate from the norm. As a result, an individual's score may be at the mean, or it may be one or more standard deviations above or below the average for their age group. This test has been standardized on samples in the United States and in a number of countries around the world (Suzuki, 2007).

deviation IQ An IQ score that indicates the extent to which a person's performance on a test deviates from age-mates' average performance.

The Kaufman Assessment Battery for Children

The **Kaufman Assessment Battery for Children (K-ABC)** (Kaufman & Kaufman, 1983, 2006) measures several types of information-processing skills grouped into two categories: *sequential processing* (solving problems in a step-by-step fashion) and *simultaneous processing* (examining and integrating a wide variety of materials in the solution of a problem). The test also assesses achievement in academic subjects, such as vocabulary and arithmetic, and efforts have been made to design the test items (many nonverbal) to be culture fair. In addition, the test designers used a wide and representative sample of many American cultural and socioeconomic groups in establishing norms for this test. An interesting innovation is that if a child fails early items on a subscale, the examiner teaches the child how to complete these items before the child does the rest of the subtest. According to the designers of the test, this ensures that no child who is capable of learning an unfamiliar task receives a failing score on it.

Kaufman Assessment Battery for Children (K-ABC) An intelligence test designed to measure several types of information-processing skills as well as achievement in some academic subjects.

Constructing Measures of Intelligence

When a **psychometrician**, or test constructor, designs an intelligence test, he or she is guided by a particular theory of intelligence. For example, if the theory emphasizes information processing, the items will be designed to tap processing functions and speed and the strategies a person uses to solve a problem. Certain goals and principles, however, are shared by all constructors of intelligence tests. These goals and principles include how the norms for a test are established, how the test is standardized, and the importance of determining a test's validity and reliability.

psychometrician A psychologist who specializes in the construction and use of tests designed to measure various psychological constructs such as intelligence and various personality characteristics.

DEVELOPMENT OF NORMS AND STANDARDS   A person's performance on an intelligence test is always described in relation to the performance on the same test of others in a particular group; the person is thus described as either average, above average, or below average in relation to other group members. **Test norms** are the values that describe the typical test performance of a specific group of people.

Age is a particularly critical factor when setting norms for children's test performance. Although children generally improve their test performance as they grow older, their score relative to the scores of other children of their age continues to be the significant factor in evaluating their intellectual development.

Psychometricians do not agree on whether comparison groups in intelligence testing should be equated on such factors as level of education, socioeconomic class, or gender. Nevertheless, in evaluating test performance, we should always consider how closely

test norms Values, or sets of values, that describe the typical test performance of a specific group of people.

Table 10-3   The Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV)

Subtests	Descriptions and Some Examples	Skills Thought to Tap
Similarities	The child is asked to tell how paired words are alike (e.g., *How are a cup and a glass alike?*).	Concept formation; categorization
Vocabulary	The child is asked to define each word in a list of words of increasing difficulty.	Concept formation; long-term memory; vocabulary
Comprehension	A series of questions ask the child to explain why certain actions or practices are desirable (e.g., *What should you do if you lose a friend's toy?*).	Factual knowledge; long-term memory; intellectual interest
Information	For each item, the child answers questions that address a broad range of general knowledge topics (e.g., *How many days are there in a week?*).	Factual knowledge; long-term memory; intellectual interest
Word reasoning*	The child is given successive clues and asked to identify the common concept being described in a series of clues (e.g., *"This is squishy and full of holes"* or *"You use it to wash things with"*).	Verbal abstraction and comprehension; analogic and general reasoning ability; integration and synthesis of different types of information; domain knowledge; generation of alternative concepts
Block design	The child is shown a model of a red-and-white design or a picture of it and is asked to re-create the design, using blocks whose sides are either red, white, or half red and half white.	Visual-motor coordination; concept formation; pattern recognition; spatial ability
Picture concepts*	The child is presented with 2 or 3 rows of pictures of familiar objects and must choose one from each row to form a group with a common characteristic (e.g., *things to eat* or *things to play with*).	Fluid reasoning; abstract categorical ability
Matrix reasoning*	The child looks at an incomplete matrix, a grid of 4 equal-size squares in which all but 3 of the squares are filled with designs. The child must look then at a separate display of 5 possible designs and choose the one that will complete the matrix.	Visual information processing; abstract reasoning skills
Picture completion	The child is asked to look at a series of pictures and, for each one, to point out what is missing from the picture (e.g., *a car with a missing wheel; a rabbit with a missing ear*).	Visual organization; perceptual reasoning; concentration
Digit span	The examiner says several sequences of digits, each longer than the preceding one, and the child is asked to repeat them either in the order in which the examiner said them or in reverse order (e.g., *2-7-4; 3-1-9-6; 8-4-2-7-5*).	Mental alertness and attention; cognitive flexibility; short-term memory
Letter-number sequencing*	The examiner reads to the child a sequence of letters and numbers and asks the child to recall the numbers (in ascending order) and the letters (in alphabetical order).	Working memory—sequencing, mental manipulation, attention, short-term auditory memory, visual-spatial imaging, processing speed
Arithmetic	The child is asked to solve, without physical aids such as pencil and paper, arithmetic problems that the examiner presents orally. The test is timed.	Working memory; mathematical skills
Cancellation*	The child is shown an array of pictures of objects and asked to find and mark every picture of a certain class of objects as fast as possible (the test is timed) (e.g., *in an array of pictures of miscellaneous things such as flowers, furniture items, animals, cleaning implements, the child might be asked to find and mark all the pictures of animals*).	Visual selective attention; processing speed

* Subtests marked with an asterisk are new to the WISC in its fourth edition.

the attributes and experiences of the person being tested approximate those of the group that was used to establish the test norms. For example, it would be inappropriate to use the same set of norms in evaluating the performance of children raised in an isolated Papua New Guinea tribal community without access to formal schooling that we use to evaluate the performance of middle-class, European American children. And as we will discuss later, norms for the latter group may not be appropriate even for the children of minority groups within North America.

Because the conditions under which a test is administered may influence performance, it is extremely important that we subject a test to **standardization**, which means that on every testing occasion the procedures that examiners follow, the instructions they give to examinees, and test scoring are identical, or as nearly so as possible.

standardization The process by which test constructors ensure that testing procedures, instructions, and scoring are identical, or as nearly so as possible, on every testing occasion.

validity The extent to which a test actually measures what it claims to measure.

TEST VALIDITY AND RELIABILITY   For any test to provide useful information about an individual, it must be valid; that is, it must measure what it claims it measures. It must also be reliable; that is, an individual's scores must be consistent over different times of measurement.

In establishing the **validity** of an intelligence test, psychometricians most often correlate performance on the test with some other measure, called a criterion, which is believed to reflect the capacity being tested. The most frequently used criteria are achievement test scores, grades in school, teachers' ratings of cognitive ability, and performance on other intelligence tests. Intelligence tests are much more successful in predicting school performance than in predicting things like creativity or social skills. Even within school performance, intelligence test scores are more closely related to mathematical problem solving and reading comprehension than to ability in drama, art, or music.

reliability The degree to which a test yields consistent results over time or successive administrations.

Reliability—the extent to which a test yields consistent results over time or successive administrations—is also critical for evaluating the utility of an intelligence test. To be useful, a test's scores must not fluctuate unpredictably from one administration to another. This is because a chief goal of these tests is to *predict* the individual's performance *beyond a single administration of the test*. Although reliability captures how much a test is useful across administrations, a related but broader issue is that of the stability of intelligence, to which we turn next.

Stability of Measured Intelligence

Is intelligence an absolute quality that remains stable, or fixed, over time, or can it change as a function of experience? To answer this question, we need to understand many things about intelligence, intelligence testing, and the limitations of intelligence measures. Tests like the Binet and Wechsler scales, which focus on the products of intelligence and measure current performance, have generally demonstrated that IQ scores are not stable over time but fluctuate. As investigators have begun to use newer tests that focus on the processes of intelligent functioning, however, the evidence for stability has been mounting.

In this section, we review longitudinal studies in which children have been tested repeatedly over long periods to examine the question of the stability of intellectual functioning over time. We also address a second, related question: Are the average intelligence levels within a population stable across time?

As we will see, the evidence to date suggests that there are both stability and change in intellectual functioning over time. This finding highlights a third question: Can intelligence be changed by purposeful effort? Throughout the rest of the chapter, we explore the many ramifications of this important issue.

PREDICTIVE VALUE OF INFANT TESTING   Most of our information on the consistency of performance on intelligence tests derives from longitudinal studies in which children—in some cases, as young as 1 month old—have been repeatedly
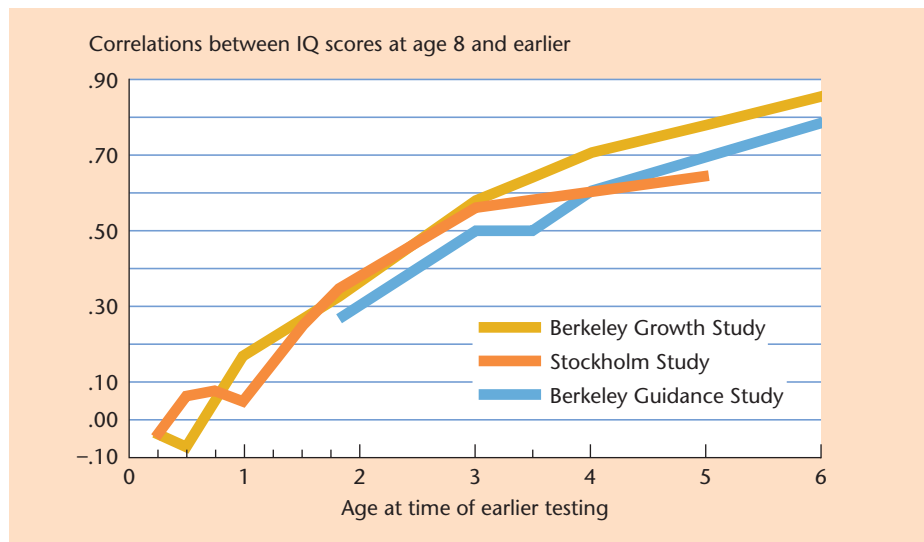
Figure 10-1

Predicting IQ scores

The height of each curve represents the degree to which children's early intelligence test scores correlated with their Stanford-Binet IQ scores when they were 8 years old. The longer the time lapse between earlier and later testing, the less predictive value the earlier score held. Notice that in the Berkeley Growth and Stockholm studies, the earliest scores were actually negatively correlated with later ones.

Sources: Honzik, 1976, 1983.

tested over time. Some of these studies are the Berkeley Guidance Study, the Berkeley Growth Study, and the Fels Longitudinal Study, in which individuals were followed for periods of time ranging from 20 to 50 years. These and other early studies have found no significant relation between intelligence test scores recorded in infancy and those attained later in childhood or even adulthood (Figure 10-1; see also Honzik, 1983; Lewis, 1983; McCall et al., 1972). However, as these early studies tended to compare infants' sensorimotor skills with later problem-solving and verbal skills, it may be that these two kinds of abilities have little relation to one another.

More recent research using infant tests that largely focus on information-processing abilities, especially attentional processes, has found higher correlations with later cognitive measures (e.g., Fagan, 1992; Rose & Feldman, 1995). These studies have largely focused on information-processing abilities, such as some of the attentional processes that we described in Chapter 4, particularly habituation and recovery. Recall that habituation is the infant's ability to discontinue attending to a stimulus after several presentations, and **recovery** is the infant's ability to recognize and attend to a totally new stimulus.

What kinds of correlations are found between measures of infant attentional processes such as habituation and recovery and later IQ scores? Fagan and his colleagues found significant but moderate correlations between infants' attention at 7 months of age and their intellectual functioning at 3 and 5 years (Fagan et al., 1991). Bornstein and Sigman (1986) also found moderately strong relations between such attentional measures in young infants and the scores these children achieved on intelligence tests at ages 3 to 6. Other researchers have found similar relations, sometimes extending even into adulthood (DiLalla et al., 1990; Rose et al., 1989). However, not all studies show such positive relations (Tasbihsazan et al., 2003).

Although we may be tempted to conclude that early individual differences in attention reflect genetic predispositions, the child's environment and other personal characteristics may be influential. In fact, one study found that attentional processing in 5-month-olds was related to the responsivity of the infants' mothers (Bornstein & Tamis, 1986). Differences in attentional processing in infants may also reflect variation stemming from other factors, such as child temperament (Karass & Braungart-Rieker, 2004). Thus, parental behaviors and the child's own emotionally related characteristics may well have a significant impact on infant intelligence.

recovery The ability to recognize a new stimulus as novel and to direct attention to it in preference to a familiar stimulus.

CHANGES IN CHILDREN'S IQ OVER TIME   Most research indicates that from the middle years of childhood onward, intelligence tests are fairly reliable predictors of later performance on such tests. For example, Honzik, MacFarlane, and

Allen (1948) found a correlation of .70 between children's IQs at ages 8 and 18. Nonetheless, there is also evidence of variability in children's IQs. Many of the children tested in the Fels study, mentioned earlier, shifted considerably upward in IQ scores between the ages of 2.5 and 17 (McCall et al., 1973). One of every three children scored higher by some 30 points, and one in seven shifted upward more than 40 points. On rare occasions, individuals have improved their IQ performance as much as 74 points. Investigators have also observed that high-IQ children are likely to show greater amounts of change than low-IQ children.

Some of the variability in IQ scores reflects the fact that different children develop cognitively at different rates of speed, just as they experience physical growth in spurts and at different ages (Garlick, 2003; Kanaya et al., 2005). These variations in cognitive development affect the reliability of IQ scores. Experiential factors may also contribute to changes in IQ. Stressful life events, such as parental divorce or death or a change in schools, can cause at least temporary disruptions in cognitive performance. Indeed, children who show the most dramatic changes in IQ over time have often experienced major changes in their life circumstances, such as foster home placement or a serious illness (Honzik, 1983).

In addition to examining the stability of individual IQ scores over time, some researchers have studied the stability of the average IQ for a group over time. Examining studies of different populations in the United States and other developed countries done between 1932 and 2002, Flynn (1987, 2007) found that the average IQ score in these nations increased by about 15 points during this time; this trend is known as the **Flynn effect**. Gains were observed in measures tapping problem-solving ability but not in measures involving learned material. The explanations for these gains in the group average are still being debated; they range from improved nutrition, changes in testing formats and procedures, and exposure to technology and media (Neisser, 1998).

Flynn effect Increase in the average IQ score in the populations of the United States and other developed countries since the early 1900s, a phenomenon identified by J. R. Flynn.

WHY DO PEOPLE DIFFER IN MEASURED INTELLIGENCE?

Closely related to the question of the stability of intelligence is one of the most controversial issues in the study of human intellectual functioning: how individual differences in intelligence develop. The modern controversy on this issue was touched off about 40 years ago when psychologist Arthur Jensen (1969) claimed that as much as 80% of differences in IQ among people were attributable to genetic, or inherited, factors and only a small proportion of differences to social-environmental factors.

In this section, we review some of the research on the side of heredity and then examine the evidence for the role of social and environmental factors in intelligence. Because the issue of the effects of ethnic and social-class differences on intelligence is so important, we have reserved much of our discussion of this topic for the major section entitled Ethnicity, Social Class, and Intellectual Performance.

How Much of Intelligence Is Inherited?

As we saw in our Chapter 2 discussions of the relative roles of heredity and environment in the development of many human characteristics, there is considerable support for the importance of heredity in intelligence. Most estimates of the heritability of intelligence—that is, the proportion of the variability in intelligence attributable to genetic factors—have supported a figure of about 40% to 50% for middle-class European Americans (McGue & Bouchard, 1987; Plomin, 1990; Plomin & Petrill, 1997). This suggests that the remaining 50% to 60% of the variability is due to environmental factors, both social (family, peers, school) and nonsocial (dietary and disease factors, pol-

lutants). Many psychologists disagree with this more or less 50-50 proposition, however. Some, like Stephen Ceci (1996), hold that the estimates of the heritability of intelligence are too high; others, like Jensen, insist that they are too low; and still others argue that these estimates depend on the match and the interaction between genetic potential and environmental opportunities (Dickens & Flynn, 2001).

VIEWS THAT EMPHASIZE HERITABILITY OF IQ   The measures of intelligence used in studies to support arguments for high levels of heritability in IQ are often based on traditional views of intellectual functioning. For instance, Jensen (1969, 1993), the most outspoken proponent of the heritability position, proposes two types of learning, both inherited but each distinct from the other. **Associative learning** (*level I* learning) involves short-term memory, rote learning, attention, and simple associative skills. For example, we might ask a child to look at a group of familiar objects and then later to recall these objects. **Cognitive learning** (*level II* learning) involves abstract thinking, symbolic processes, conceptual learning, and the use of language in problem solving. An example of cognitive learning is the ability to answer questions like the following:

What should be the next number in the following series? 2, 3, 5, 8, 12, 17, . . .

How are an apple and a banana alike?

Most intelligence tests measure primarily cognitive learning abilities. Some, however, include some items that tap associative learning ability. Jensen suggests that associative learning is equally distributed across all people but that level II learning is more concentrated in middle-class and European American groups than in working-class or African American groups. And some scholars claim, because people tend to marry within their own social and ethnic groups, the differences between cognitive learning across populations, as measured in IQ tests, will tend to increase over time (Herrnstein & Murray, 1994).

These conclusions have been called into question by studies comparing the IQs of people with differing numbers of genetic markers for African ancestry. Such studies have found no association between the number of markers of African ancestry and IQ (Nisbett, 1998). In addition, Williams and Ceci (1997b) have shown that the IQ gap between racial groups has been decreasing, rather than increasing, in recent years.

CULTURE AND INHERITANCE   Comparing intelligence scores across groups is a complex process. It is inappropriate to use estimates of the heritability of intelligence obtained from one group in interpreting findings based on the study of another group unless it can be demonstrated that the critical contributions from the environment to support the development of IQ are present across these groups. This is because environmental conditions will influence the extent to which an inherited ability can be expressed. Let's take as an example a person's height, a physical characteristic of human beings that, when children have good nutrition and are immunized against serious diseases, is essentially the result of inheritance (Kagan, 1969). Because the majority of North Americans are well nourished, the genes associated with height express themselves fairly directly in the actual height of an American child. However, all inherited characteristics interact with environmental forces to some degree, and so does height. In cultures with extremely adverse health and/or nutritional factors, the genetic contributions to physical stature are lessened relative to more advantageous situations. This is why most starving children, if they live to adulthood, remain small of stature, regardless of the typical height of the ethnic groups to which they belong.

In the same fashion, heritability measures regarding intelligence for middle-class European American families with reasonably similar backgrounds and life circumstances may be quite different from such measures for minority or working-class groups whose circumstances may differ dramatically from the middle-class groups. In short, genes depend on the environment for their expression (Moore, 2001). Poor nutrition,

associative learning
According to Jensen, lower level learning tapped in tests of such things as short-term memorization and recall, attention, rote learning, and simple associative skills. Also called *level I* learning.

cognitive learning   According to Jensen, higher level learning tapped in tests of such things as abstract thinking, symbolic processing, and the use of language in problem solving. Also called *level II* learning.

disease, and stress due to myriad factors—for example, economic deprivation, over-crowded living quarters, homelessness, abuse, civil unrest, war—may overwhelm and thus minimize the genetic contribution to intellectual performance (Garcia Coll, 1990; Huston et al., 1994; Neisser, 1998).

THE MALLEABILITY OF INHERITED CHARACTERISTICS

Finding evidence for genetic influence on intelligence in a population does not suggest that differences among individuals are unchangeable (Plomin & Petrill, 1997). Consider some other kinds of developmental differences, such as blindness and deafness, which we know in some cases are influenced by genetic factors. The fact that these conditions may be genetically induced hasn't interfered with the ability of special education programs to help affected children. And as we noted earlier in this chapter, the gap between the scores of African American and European American students on IQ tests and tests of achievement in mathematics and reading have narrowed substantially over the last few decades (Hauser, 1998). Moreover, some recent research has shown that when characteristics of the home environment are taken into account, the gap narrows still further (Brooks-Gunn et al., 2003).

Environmental Factors

Even strong advocates for the genetic basis of human intelligence understand that children are brought up in circumstances that range from the most favorable to the most destructive. Furthermore, most scholars recognize that the quality and amount of stimulation offered to children in these varying conditions affect intellectual development. In this section, we consider some of the factors that can affect the child's intellectual abilities before or during birth; in addition, we explore the important influences of the family, the school and peer culture, and the community.

PREGNANCY AND BIRTH   As we pointed out in Chapter 3, such factors as poor maternal nutrition can have highly influential and lasting effects on a child. Moreover, an extensive body of research details the negative effects on intellectual development of such things as maternal disease, such as AIDS, or a mother's alcoholism or addiction to other drugs. In addition, events attending the process of birth, such as oxygen deprivation, can have destructive effects on a child's mental functioning. Deficits or defects traced to such factors are considered **congenital**, meaning that they occur during gestation or at birth. Rather than genetic in origin, they are either transmitted directly from the mother to the fetus or result from events during the birth process.

congenital Characteristic acquired during development in the uterus or during the birth process and not through heredity.

THE FAMILY   The child's first social environment, which is usually the family, has important influences on her intellectual functioning. A supportive, warm home environment that encourages a child to become self-reliant, to express her curiosity, and to explore has been linked to higher intellectual functioning (Petrill & Deater-Deckard, 2004). Parents who are emotionally and verbally responsive to their children, who provide an appropriate variety of learning experiences, and who encourage their children's interest in and efforts at learning tend to have children with higher IQ scores (Bradley et al., 2001; Wachs, 2000). It's important to note, however, that such family environments do not uniformly produce high-achieving children. Recall from Chapter 2 that even though children in the same family have many shared environmental influences, they are also subject to nonshared environmental stimuli that may counteract other influences and affect their intellectual development (Reiss et al., 2000; Rutter, 2006b). Moreover, because the home environment is not independent of inherited intelligence factors, the ways in which the family environment is related to children's intellectual functioning are complex.

SCHOOLS AND PEER GROUPS   Although more years of school and higher quality schooling are related to increases in intelligence scores, the contrary is also true. Deficits in education may cause IQ scores to decline (Ceci, 1996; Ceci & Williams, 1997). Declines in intellectual skills have been associated with lack of formal education, dropping out, and too much time off from school. Numerous studies have also shown that children who have attended a high-quality preschool have higher skill levels than children who have not, even when the two groups are similar in socioeconomic status, family environment, and prior skill levels (Wachs, 2000).

Poor and minority students in inner-city and rural neighborhoods in the United States often face a substantial disadvantage in school quality compared with those in wealthier areas. In addition, these students, due to a variety of environmental factors, are likely to enter school with no preschool experience and with lower levels of skills compared with their middle-class peers. Furthermore, disadvantaged students tend to fall further behind as they progress into middle and high school (Molfese & Martin, 2001; Turkheimer et al., 2003). Cultural differences and negative teacher attitudes may also hinder adjustment and learning for these children (Comer, 1996, 2004; Eccles, 2007).

Peers also influence children's attitudes toward, and success in, school. For example, one study found that peer groups of Asian American students supported each others' academic pursuits and participated in education-related activities such as studying together (Steinberg et al., 1992). In contrast, some researchers have reported antiacademic attitudes among African American students (Ogbu, 1988). Because of the strong adolescent need to belong in a peer culture, the effect of negative feedback from their peers may often outweigh parental encouragement of academic achievement (Steinberg et al., 1992). Sometimes, African American children who succeed in school choose strategies to hide or camouflage their true attitudes toward schoolwork and their actual efforts to achieve academic success (Fordham & Ogbu, 1986). For example, a student may excel in athletics or take on a role such as class comedian to disguise his intellectual pursuits.

THE COMMUNITY   The community as a cultural unit may have significant effects on a child's cognitive and intellectual development. For example, studies have shown that children living in isolated circumstances, such as rural areas, score lower on IQ tests than children in suburban or urban areas (Ceci, 1991; Flynn, 1987). Similarly, economically disadvantaged urban areas of modern cities are often associated with slowed intellectual development. The poor diets, unsafe housing, and high levels of violence and unemployment that characterize impoverished areas may all contribute to less adequate intellectual functioning (Bronfenbrenner et al., 1996; Evans, 2003; Garbarino, 1995; Pollitt, 1994).

It's important to stress, however, that in some cases environments stimulate and help children to develop intellectual abilities that are sophisticated, highly adaptive, and meaningful in their specific cultural circumstances (Sternberg et al., 2007). Intelligence tests devised to reveal intellectual capabilities in varying cultural contexts, such as regions in Africa (Serpell & Haynes, 2004) and the Eastern Mediterranean–Middle East (Gulgoz & Kagitcibasi, 2004), have been helpful in identifying how

Family members have a great influence on intellectual development. Here a mother is using marbles and printed numbers to encourage her son in learning to match number symbols and names with quantities of actual objects.

the construct of intelligence can be construed and measured in different cultural set-tings. This research indicates that concepts of intelligence can differ widely across cultures and that social factors, such as responsibility and sensitivity toward the family or community, are an important component of many of these conceptions. In recent years, the idea of social intelligence has even risen in prominence in discussions of intelligence in the United States (Goleman, 2006). Finally, other research has revealed intelligent actions that people carry out in their cultures and that are rarely tapped in typical tests of intelligence. For instance, the Pulawat islanders of Micronesia, who have little formal education or technology, have developed a navigational system that reveals a complex understanding of the relations among direction, winds, tides, and currents and that enables them to sail long distances out of the sight of land (Gladwin, 1970). Nevertheless, these skilled navigators would not perform well on a standard test of intelligence, despite the fact that their navigational skills evidence high levels of intelligence. Observations like these show us how important it is to analyze intellectual performance within the individual's cultural context (Ceci, 1996; Hutchins, 1996).

ETHNICITY, SOCIAL CLASS, AND INTELLECTUAL PERFORMANCE

Research has found relations between ethnicity and social class and intellectual performance. In this section, we discuss these relations in greater depth. *Social class* is a broad term that includes such variables as education, occupation, income. The term *socioeconomic status* (or SES) is often used to refer to a combined assessment of these three variables (Benokraitis, 1998). Because these factors are frequently associated with each other, researchers tend to study them together. However, because they are closely associated, researchers often find it very difficult to disentangle one factor from another—for example, the effects of having a particular occupation from being poor.

Ethnicity presents particular problems of measurement and analysis because researchers tend to lump subcultures together. Thus, a study of "Asians" or "Asian Americans" may include Chinese, Filipinos, Indians, Japanese, Koreans, and Vietnamese as one group, and as a result, the study will mask important differences among these groups. Another problem related to both ethnicity and social class is that researchers' assumptions may influence the kinds of questions they ask and the way they ask them. For example, many studies of Asian Americans ask why these children are successful in school, whereas similar studies of African Americans may ask why these children perform poorly. Scholars working in this area recommend research that focuses on each group's strengths as well as on the areas in which each could improve (Spencer, 2006).

With these limitations on existing research in mind, let's look at three main types of explanations for the differences in IQ and intellectual performance observed among different ethnic and socioeconomic groups. The first type proposes that existing standardized tests are inappropriate for lower class and minority children. The second type attempts to focus specifically on the roles socioeconomic factors play in intellectual performance. The third type explores how parent-child interactions may differ among social classes and ethnic groups.

Are Intelligence Tests Biased Against Minority Groups?

Those who argue that existing tests of intelligence are biased against a sizable group of the American population point out that the most widely used tests were standardized on European American middle-class people (Valencia & Suzuki, 2001). They

maintain that for this reason test items do not accurately measure the problem-solving abilities appropriate to the circumstances in which some members of ethnic groups live. These tests, their detractors insist, draw on the language, experience, and values of middle-class European American children. For example, the vocabulary used on traditional IQ tests often differs from the dialect or even language some children use every day. On this view, some researchers have argued that minority children's lower verbal scores may reflect cultural bias, not lack of intelligence. In support of this position, tests such as the Kaufman battery, aimed at minimizing cultural bias, show less difference between the scores of African American and European American children than do standard IQ tests.

In his concept of **stereotype threat**, Claude Steele (1997) has offered yet another explanation for poor performance on IQ tests among ethnic minority youth. According to Steele, people are aware of the stereotypes that society holds about their particular groups—for example, the stereotype that certain ethnic groups are intellectually inferior to other ethnic groups. In situations in which this stereotype can be tested, Steele believes that individuals from the group for which there is a negative stereotype have self-doubt and worry about confirming the stereotype in their test performance. This self-doubt has the effect of hurting the individual's performance, which in turn confirms the stereotype. Stereotype threat has been found in children as young as 6 years of age, and by age 10, most children are aware of broadly held social stereotypes regarding certain stigmatized minority groups such as African Americans and Latinos (McKown & Weinstein, 2003). Moreover, children in these minority groups are more aware of the stereotypes than children who are not in these groups. And as Steele (1997) predicted, children in these minority groups who are aware of the stereotypes performed less well on cognitive tasks when they were told the purpose was to test their ability.

stereotype threat Being at risk of confirming a negative stereotype about the group to which one belongs.

This child is working on the block design subtest in the Wechsler Intelligence Scale (WISC).

ETHNIC GROUPS MAY EXCEL IN DIFFERENT AREAS

One criticism of IQ tests is that they fail to measure the ability to cope with everyday activities and problems of life with which people must contend. Following up on this criticism, Mercer (1971) studied a large group of children and young adults whose IQ scores classified them as mentally retarded. Mercer tested these individuals in their adaptive abilities—that is, their abilities to perform skills required for such things as self-care (e.g., dressing), household tasks (e.g., shopping, cooking), holding a job, and traveling alone to and from their jobs. The results were amazing: 90% of the African American children and 60% of the Latino children who had IQs below 70 (i.e., these children scored in the range of measured intelligence traditionally labeled "mentally defective") *passed* Mercer's test, but every European American child with an IQ below 70 *failed* it! The disturbing implications of these findings were that minority children are far more likely than European American children to be inappropriately classified as mentally retarded—a label that will have a pervasive effect on their life experiences and on others' expectations of them.

On the theory that members of different groups may show different patterns of abilities on tests, one classic study compared the verbal skills, reasoning, and numerical abilities of middle- and lower-class African American, Chinese American, Jewish, and Puerto Rican children between about 6 and 7 years of age (Lesser et al., 1965). Lesser and his colleagues found that these four groups

did indeed have different profiles of ability scores. For instance, Jewish American and Chinese American children scored higher on these tests than African American and Puerto Rican children; African American children showed greater verbal abilities than Chinese American children and scored better on reasoning than Puerto Rican children; and Puerto Rican children scored slightly above African Americans on numerical and spatial abilities. Social class influenced score levels for all groups; however, differences in score level due to socioeconomic factors were greatest for African Americans, suggesting that social-class disadvantages had relatively greater impact on these children. These and other findings (e.g., Neisser et al., 1996; Williams, 1998) have led some investigators to reason that understanding the relation between ethnicity and performance on intelligence tests requires examining achievement levels on different kinds of cognitive skills than at overall IQ levels.

The Effect of Context and Cultural Background on Intellectual Performance

Not only may traditional intelligence tests be biased in their content and approach, but the conditions under which they are administered to minority children of lower socioeconomic status may also have interfered with these children's ability to perform (Spencer, 2006). Recall that the newer, information-processing approaches to intelligence testing have pointed to the importance of context in children's intellectual performance (Das, 2004). Researchers influenced by these ideas have tried to familiarize children with the test environment and test materials, to encourage them on various tasks, and to use material rewards, such as candy, to motivate performance. These efforts have been successful with some low-income and minority-group children; in fact, they have been significantly more successful with economically deprived children than with middle-class children (Zigler et al., 1982). These findings support the view that intelligence tests do not measure the competencies of low-income and ethnic minority children as well as they measure the abilities of middle-class European American children.

Understanding the relations of ethnicity and intellectual performance has also been informed by studies that look at how cultural background and experiences contribute to performance on achievement tests. In recent years, both scholarly and lay publications have documented a trend in North American students' academic performance that is disturbing to many. These reports have warned that in mathematics and science, and even in the language arts, American students are falling behind students in other countries, particularly countries in Asia (Martin et al., 2004). Research, such as that conducted by Harold Stevenson and his colleagues (described in Box 10-1) that followed groups of North American, Chinese, and Japanese students from the first through the eleventh grades, raises many provocative questions about the influence of cultural values and practices on intellectual performance and academic achievement (Chen et al., 1995; Stevenson & Stigler, 1992). One question is whether patterns of interaction in Asian American families can explain the high levels of performance frequently shown by Asian American children. Whereas African American, European American, and Latino American parents also value education highly, their children do not experience the same level of academic success seen in Asian American families. Asian American parents strongly support their children's academic achievement (Chao, 2001). They hold high expectations for their children's education and also tend to convey the idea that achievement is part of children's duty to parents. Asian American families often strictly monitor the time their children spend in homework and in free play. In addition, they frequently profess the belief that effort will be rewarded (Slaughter-Defoe et al., 1990). This research suggests that the critical family factors that determine the different patterns of achievement across diverse ethnic groups merit further study.

BOX 10-1

Child Psychology in Action

MAKING THE GRADE IN JAPAN, TAIWAN, AND THE UNITED STATES

In recent years, the declining school achievement of U.S. children has received substantial attention by the media. What can psychology tell us about children's academic achievement in the United States? Longitudinal studies by Harold Stevenson and his associates (Chen et al., 1995; Stevenson et al., 1993; Stevenson et al., 1990) have now provided evidence that in the earliest months of first grade, children in the United States already lag behind children who live in other parts of the world in academic achievement. Thus, although differences in academic performance may well reflect varying educational systems, the fact that these differences appear when children have had little exposure to formal education suggests more is involved than inadequate educational practices.

Over a 10-year period, Stevenson and colleagues administered tests of reading and mathematics ability to groups of first, fifth, and eleventh graders in

classrooms in two U.S. metropolitan areas (Minneapolis, Minnesota, and Fairfax County, Virginia), in two East Asian cities (Beijing, China, and Taipei, Taiwan), and in Japan (Sendai). The U.S. students included four cultural groups—European, Chinese, African, and Latino American—although not all these groups were represented in every study. To the degree possible, the investigators retested the same students at different ages; over the 10-year span, Stevenson and his associates tested several thousand children. In each study, the researchers interviewed teachers, students, and students' mothers on a variety of topics, such as the value of education, beliefs about learning, attitudes toward school, and family involvement in children's schoolwork.

In one study, there were noticeable differences in reading test scores among seven groups of students even in the first grade (Figure 10-2). In first
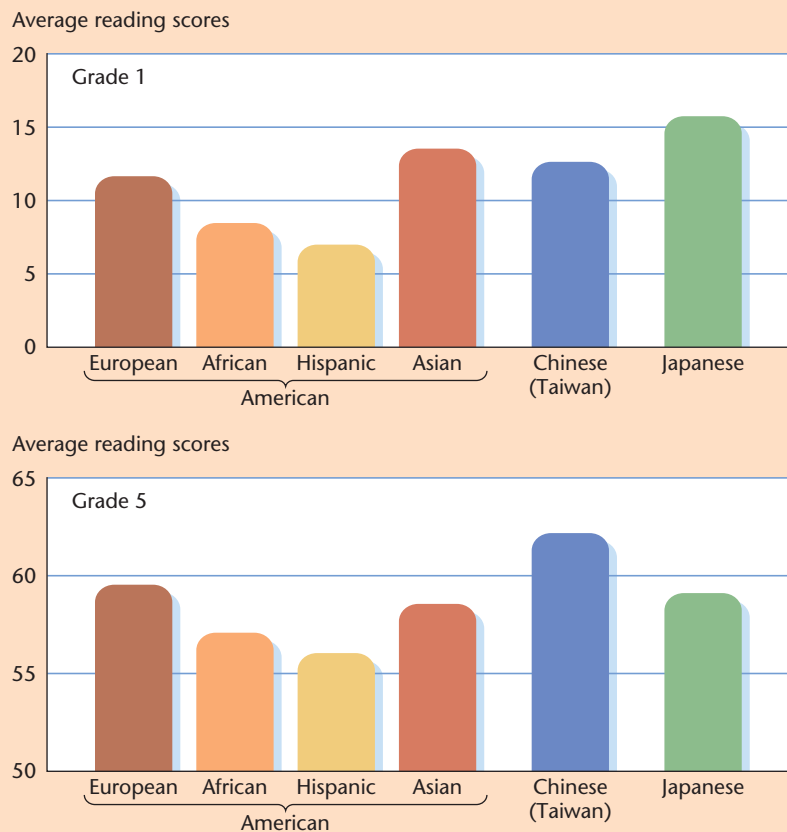
Figure 10-2

Reading scores in China, Japan, and the United States

Across both first and fifth grades, Chinese and Japanese students tended to do better in reading than any of the U.S. cultural groups. In first grade, Asian American students ran second to Japanese students but, for some reason, dropped down by fifth grade. The relations among European, African, and Latino American students remained fairly stable from first to fifth grade; these groups scored from higher to lower, respectively.

Source: Adapted from Chen et al., 1995.

(*Continued*)

BOX 10-1 (*Concluded*)
Psychology in Action

grade, Japanese students scored highest, followed fairly closely by Asian American, Taiwanese, and European American students; African American and Latino American students scored the lowest. By fifth grade, Taiwanese and European American students had jumped ahead of Japanese and Asian Americans. American students scored considerably below others on a mathematics test, and between first and fifth grade, these differences became more pronounced (Figure 10-3): At both times, Chinese (Beijing, Taiwan) and Japanese students had the highest scores, with Asian Americans following close behind.

What could be contributing to these results? Stevenson and his colleagues found no evidence that the American children had lower intellectual levels, and parental education levels were highest among European American students. However, there were marked differences in parents' beliefs, their reported activities with their children, and the evaluations they made of their children and their educational systems. Chinese and Japanese mothers generally viewed academic achievement as the child's most important pursuit. Once children entered school, Chinese and Japanese families mobilized to help their children

Figure 10-3

Mathematics skills in China, Japan, and the United States

As in reading, Chinese and Japanese students outscored U.S. students in mathematics. Although the differences were small in grade 1, they were large in grade 5, and Asian American students clearly led their American peers.

Source: Adapted from Chen et al., 1995.
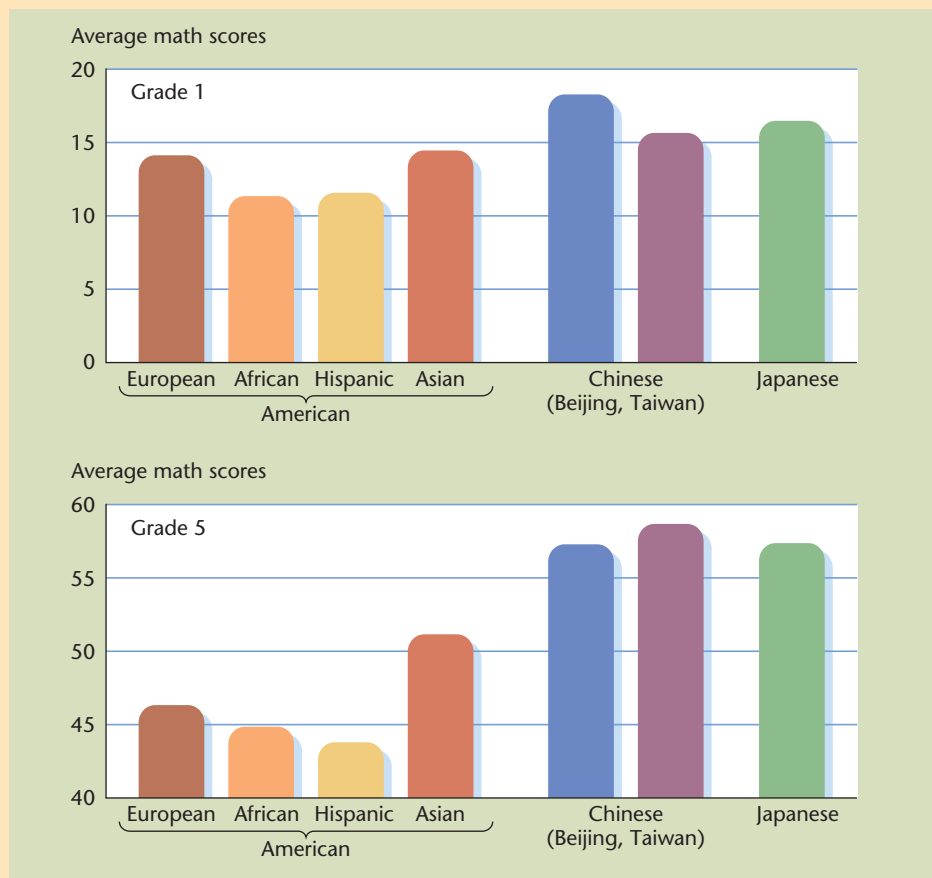
Social-Class Influences on Intellectual Performance

Separating social class from intelligence and achievement is enormously challenging. Yet, if nongenetic factors contribute about 50% of the variation in IQ scores and intellectual performance, it is important to do this to gain a better understanding of the

Students' mothers (percent)

Attitudes toward children's academic performance
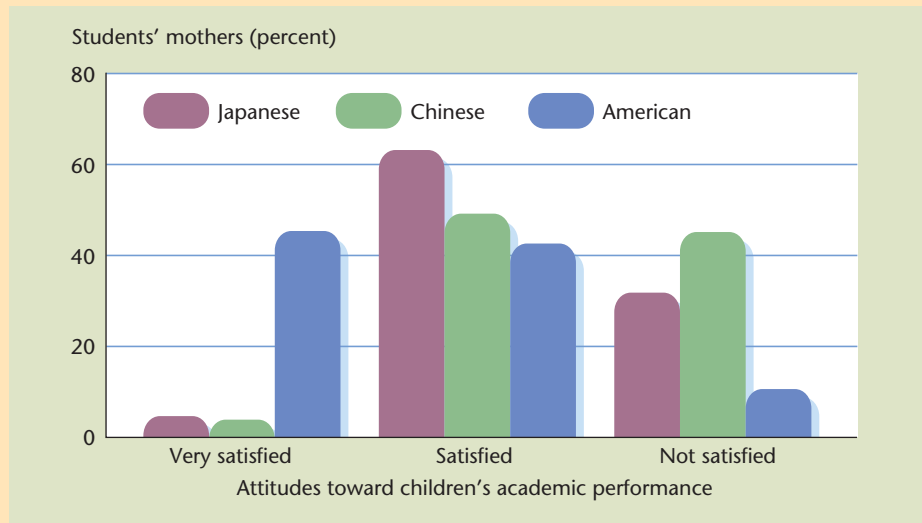
Figure 10-4

Mothers' attitudes toward their children's academic performance

In 1990, more Japanese and Chinese mothers than U.S. mothers were "satisfied" with their children's academic performance. However, more than 40% of American mothers, but fewer than 5% of Chinese and Japanese mothers, were "very satisfied."

and to provide an environment conducive to achievement. Japanese mothers, in particular, were likely to see themselves as *kyoiku mamas*—that is, "education moms" responsible for assisting, directing, and supervising their children's learning.

American mothers were less likely to be involved in helping their children with homework than mothers in other groups. They tended to put more emphasis on the role of innate ability in school performance and less on the role of effort. Mothers in all three countries viewed their children's academic performance as above average, but as Figure 10-4 shows, American mothers voiced the most positive views about their children's scholastic achievement and experience, even though they were aware of the country's low rank in comparative studies of children's performance.

American children spend significantly less time on homework and reading for pleasure and more time playing and doing chores than Japanese or Taiwanese children do. In one study, only 17% of first-grade and 28% of fifth-grade Taiwanese children did chores, in contrast to 90% and 95% of American first and fifth graders, respectively. When researchers asked one Tai-wanese mother why she did not assign her children chores, she replied, "It would break my heart. Doing chores would consume time that the child should devote to studying."

American mothers appeared to be more interested in their children's general cognitive development than in their academic achievement per se, attempting to provide the children with experiences that fostered cognitive growth (Stevenson et al., 1990). These mothers reported reading more frequently to their young children, taking them on excursions, and accompanying them to more cultural events than did Chinese or Japanese parents (Stevenson et al., 1993).

What might Americans do to improve U.S. students' competitive status? Some school districts have moved toward lengthening the academic year, which has traditionally been much shorter than the school year in Asian countries. The shorter U.S. school day may also contribute to the fact that American students spend more time than Asian students in extracurricular pursuits, including sports activities, socializing, and dating. But if Stevenson and his colleagues are right, intervention needs to begin earlier and at home.

process of intellectual development. In this section, we look at some research efforts to isolate social-class factors in intellectual performance.

SOCIAL-CLASS FACTORS AND CUMULATIVE RISK   Investigators in the United States and other nations have described differences in performance on standardized intelligence tests among children from various social-class groups (Huang & Hauser, 1998; Neisser et al., 1996). In the United States, children in the lower

socioeconomic classes score 10 to 15 IQ points below middle-class children (Brody, 1992). These differences are generally observed before children enter school and remain consistent throughout the school years (Kennedy, 1969; Moffitt et al., 1993). However, when factors such as family conditions and home environment are taken into account, the differences in scores are reduced somewhat (Brooks-Gunn et al., 2003). Longitudinal research in Scotland has revealed similar patterns in that children in families from the lowest social-class group in the study had IQ scores in the years of middle childhood that were significantly lower than children in families from higher SES groups (Lawlor et al., 2005).

cumulative risk The notion that risk factors in children's life circumstances have cumulative negative effects on their intellectual performance.

The concept of **cumulative risk** may help us understand the significance of the effects of socioeconomic factors on intelligence and intellectual performance. If in the life circumstances of a given child only one of the many risk factors that may compromise healthy development, such as poverty, is present, many other factors in that child's environment may outweigh the risk that one factor poses for her. However, as more and more negative factors are added to the child's life experience, her risk of poor cognitive outcomes will increase (Carmody et al., 2006; Sameroff & Fiese, 2000). To test this notion, Sameroff and colleagues (Sameroff et al., 1987, 1993) identified specific environmental factors likely to present risks to children's cognitive development (Table 10-4) and then, among 215 four-year-old African American, European American, and Puerto Rican children, examined the links between these risks and IQ scores. As you can see in Figure 10-5, the findings were striking. Children with only one risk factor had verbal IQ scores well above average; an IQ of 115 is considered "bright normal." As the number of environmental risk factors increased, however, IQ scores dropped, and children whose life circumstances included seven or eight of the risk factors had IQs 30 points lower, putting them in the "dull normal" range.

Social class did not appreciably affect these findings: The presence of several risk factors was associated with low IQs in families of both low and high socioeconomic status. However, any one of these factors was more likely to be present in low-income families than in families with more financial advantages. A follow-up study (Sameroff et al., 1993) of 152 of the same families when the children were 13 years old revealed a similar pattern: a 30- to 35-point IQ difference between the children whose risks were few and those who confronted many risk factors.

These findings argue for the notion that children who confront multiple risk factors face potential declines in their performance on intelligence tests (Grissmer et al., 1998). The findings also allow us to hypothesize that in the absence of such risk factors, children should achieve higher test scores. Psychologists have tested this hypothesis by studying African American children who were adopted by economically well-off

Figure 10-5

Risk and intellectual performance

This graph dramatically illustrates the relationship between risk factors and intellectual performance. The more risk factors (e.g., poverty, hunger, poor clothing, family stress) in the lives of these 4-year-olds, the lower their scores on the Wechsler Preschool and Primary Scale of Intelligence.

Source: Sameroff et al., 1993.
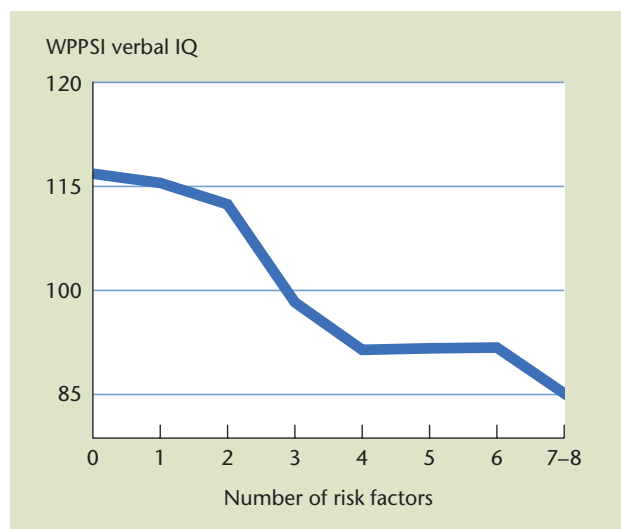
Poor maternal mental health
High maternal anxiety
Low maternal education
Head of household either unemployed or in unskilled occupation
Father absent from family
Minority-group membership
Family in which there were more than four children
High incidence of stressful events such as illness, job loss, or death in the family

Table 10-4

Major risk factors that endanger children's cognitive development

Source: Sameroff et al., 1993.

European American parents (Scarr & Weinberg, 1976). As you can see from Figure 10-6, adopted African American children achieved scores some 20 points above the national average for black children, and the younger they were at adoption, the higher their scores were. Follow-up studies (Scarr, 1997, 1998; Weinberg et al., 1992) found that the adoptees experienced a gain in IQ similar to the gains of biological children of the adoptive parents. Although the adoptees' IQ scores more closely resembled those of their biological parents than their adoptive parents, their higher scores and continued gains showed the strong influence environment may have on IQ and on the long-term maintenance of gains. Other adoption studies have echoed these results (e.g., Capron & Duyme, 1989).

SOCIAL CLASS AND PARENT-CHILD INTERACTIONS   Several investigators have suggested that maternal behavior differs across social classes and may differentially affect children's intellectual performance in the school setting. For instance, middle-class mothers were more likely than lower class mothers to speak in response to their babies' vocalizations (Hart & Risley, 1995; Lewis & Wilson, 1972), and their infants tended to stop vocalizing and listen when their mothers spoke. In contrast, lower class children were more likely to continue vocalizing when their mothers were speaking (Lewis & Freedle, 1973). Some scholars have suggested that these early differences in the way infants attend to their mothers' speech may be related to later differences in the ease with which children learn from verbal information (Hoff, 2005).

Barnard, Bee, and Hammond (1984) found that mothers who had gone beyond a high school education were more highly involved with their infants than mothers who
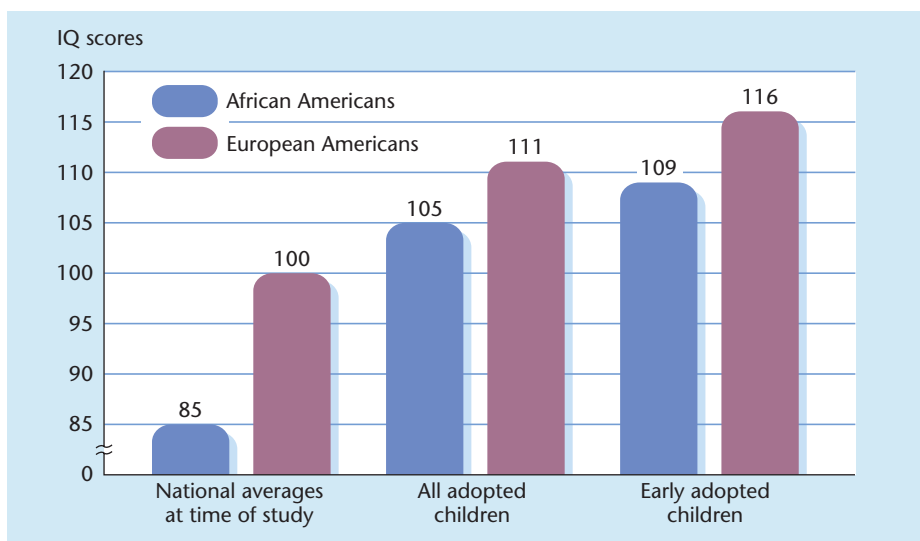
Figure 10-6

How do children adopted into middle-class European American homes fare?

Both African and European American children adopted into middle-class European American homes obtained IQ scores that were substantially above the national averages for their respective groups. And the earlier the child was adopted, the better the IQ score. It is not known why the European American adoptees fared somewhat better than the African Americans.

Source: Adapted from Scarr & Weinberg, 1976.

had not finished high school; these differences, measured at several intervals before the children reached age 2, were significantly related to the children's IQ scores at age 4. Specific behaviors that are important include reading to young children before they enter school. On average, 73% of young children whose mothers graduated from college were read to every day by a family member, compared with 60% of children whose mothers had some years of college, 49% of children whose mothers only finished high school, and 42% of children whose mothers had not finished high school (Federal Interagency Forum on Child and Family Statistics, 2001). These different rates are significant in that reading with an adult in the preschool years is associated with better reading achievement in elementary school (Bus et al., 1995).

In China, where there are relatively small differences in income across groups that vary in education, Tardif (1993) found that less educated parents used more commands with their toddlers than better educated mothers. This style of interaction is likely to be associated with poorer cognitive development. Finally, many researchers have argued that stress, presumably more commonly experienced by lower class parents than by middle-class parents, may directly influence parental styles of interaction—for example, leading parents to be more concerned with discipline than with positive emotional communication (Goldstein, 1990; Hess & Shipman, 1967; McLoyd et al., 2005).

ACHIEVEMENT MOTIVATION AND INTELLECTUAL PERFORMANCE

achievement motivation
A person's tendency to strive for successful performance, to evaluate her performance against standards of excellence, and to feel pleasure at having performed successfully.

Children's academic performance is affected not only by their experiences in the family, school, peer group, and community but also by their own **achievement motivation**—that is, their tendency to strive for successful performance, to evaluate their performance against specific standards of excellence, and to experience pleasure as a result of having performed successfully (Wigfield et al., 2006). Variations in achievement motivation and intellectual performance are often related to a child's emotions and opinions of himself as a person and a learner—in short, to the sense of self (Dweck, 2000, 2006). Some children have negative feelings about specific learning tasks and may be convinced of their inability to learn in certain areas. Sometimes, a child's feelings and beliefs about his ability to succeed are sufficiently negative that they distract the learner from the task itself and may prevent him from learning (Bransford et al., 1999).

Researchers have identified two different response patterns among children working on a challenging task at which they could fail (Heckhausen & Dweck, 1998). In an early study, fifth- and sixth-grade children attempted to solve a series of difficult problems that resembled a game of Twenty Questions (Diener & Dweck, 1978). At first, the children were able to solve the problems, but then the experimenter presented several very hard problems that they failed. Some children maintained or even improved their level of performance despite failure on some of the hard problems; the researchers labeled these children mastery-oriented because they were focused on gaining skill or mastery at the problems. In contrast, other children tended to give up easily or to show marked performance deterioration when working on challenging problems; the researchers labeled these children helpless.

When mastery-oriented children performed poorly, they expressed neutral or even positive emotions, attributed their failure to insufficient effort rather than to lack of ability, and maintained high expectations for future success. Helpless children, on the other hand, expressed negative emotions such as frustration, blamed their own lack of ability for their performance, and expressed low expectations for future performance.

What might cause different children to react so differently to the same task? Helpless and mastery-oriented children do not differ in their actual ability levels; rather, they *think* differently about ability and achievement (Dweck, 2006; Heckhausen & Dweck, 1998; Kamins & Dweck, 1999). Mastery-oriented children tend to have *learning goals.*

In other words, they are more concerned with improving their skills and learning new things than they are with specific judgments of their ability. Children who show the helpless pattern, on the other hand, tend to have *performance goals;* that is, they are concerned with "looking smart," obtaining positive judgments, and avoiding negative judgments of their ability. Dweck and her colleagues have proposed that these different goals are associated with different beliefs about intelligence itself. That is, mastery-oriented children tend to hold an *incremental* view of intelligence, viewing intelligence as a body of skills and knowledge that can be increased with effort. In contrast, helpless children tend to hold an *entity* view of intelligence, believing, if implicitly, that intelligence is a fixed and unchangeable entity that people possess in varying degrees.

Dweck suggests that the two views of intelligence and the two goals orient children to react very differently to achievement tasks. As Table 10-5 illustrates, when children are successful at tasks, they do not appear to differ in their behavior; even children with an entity view and performance goals are likely to show the mastery-oriented pattern. However, when children fail at a task, their different views of intelligence lead to different behaviors. Under these circumstances, mastery-oriented children may interpret their failure as an indication that they must work harder to learn more, whereas helpless children may see failure as evidence of their lack of ability and may give up. Of course, different situations can elicit different responses, and mastery-oriented children may occasionally show helpless responses when examiners or others put a lot of stress on performance goals (Dweck, 2001, 2006; Heckhausen & Dweck, 1998).

Experience in the family in the preschool years may affect the development of these views of performance (Eccles, 2007). Children whose parents encouraged more mastery-oriented behavior from them as toddlers—for example, by promoting independence and persistence in solving problems—show more mastery-oriented behaviors later on when they enter school (Pomerantz et al., 2005). In contrast, some environmental conditions may even promote helplessness in children. In research on rural children in upstate New York, Gary Evans (2003) found that children living in poverty who experienced a number of physical stresses (e.g., crowding and poor-quality housing) and psychosocial stresses (e.g., family turmoil or violence) were more likely to behave in a helpless manner when presented with a challenging puzzle task than were poor children who had fewer stresses in their lives.

Culture may also play a role. Chen and Stevenson (1995) found that European American students tended to endorse "having a good teacher" as the most important factor in their performance in mathematics, whereas Asian students reported that "studying hard" was the most important factor (Figure 10-7). Chen and Stevenson and their colleagues (Chen & Stevenson, 1995; Stevenson, 2001; Stevenson et al., 2000) found that,

Table 10-5 Views of intelligence, goal orientations, and behavior patterns for high and low performance levels

View of Intelligence	Goal Orientation	Present Performance Level	Behavior Pattern
Entity (intelligence is fixed)	**Performance** (to gain positive, avoid negative judgments of competence)	High	**Mastery-oriented** (seeking challenge, persistence)
		Low	**Helpless** (avoiding challenge, low persistence)
Incremental (intelligence is malleable)	**Learning** (to increase competence)	High	**Mastery-oriented** (seeking challenge that fosters learning, persistence)
		Low	**Mastery-oriented** (seeking challenge that fosters persistence)

Sources: Dweck, 2001; Dweck & Leggett, 1988.

Figure 10-7

To study hard, or to be taught well—is there a question?

When researchers asked Chinese and Japanese high school students in their own countries, and Asian and European American students in the United States, to choose among several factors that may influence students' academic performance, the majority chose either "studying hard" or "having a good teacher." Within these choices, the Japanese and Chinese students were far more likely to choose the first of these factors, whereas U.S. high school students were much more likely to choose the second.

Source: Chen & Stevenson, 1995.
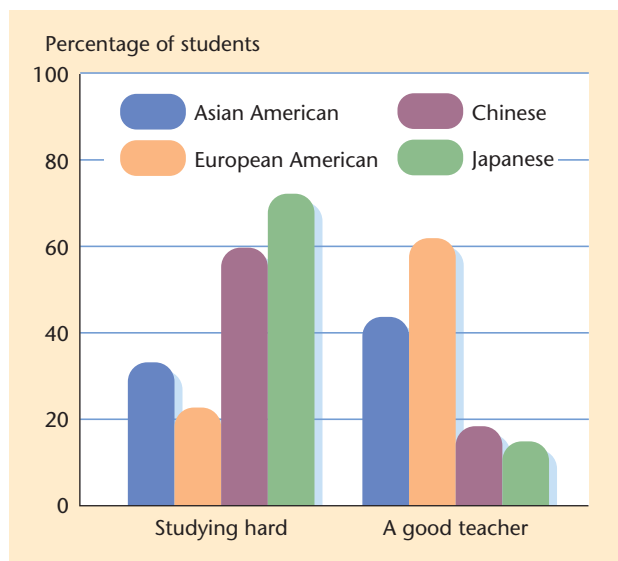
compared with Asian students and their parents, European American students had lower standards for their academic work, and their parents more often attributed their children's performance to innate ability.

Finally, the timing of certain school-related experiences may affect children's achievement or their motivation to achieve. Traditionally, the first 8 years of elementary school (or 9, including kindergarten) and the 4 years of high school were arranged in two separate segments. However, in recent years, the first 6 years of elementary school are grouped together, followed by 3 years of junior high or middle school (grades 7–9), followed by 3 years of high school (grades 10–12). Research suggests that such organizational variations make a difference in children's academic experience. Simmons, Blyth, and McKinney (1984) compared students moving from the sixth to the seventh grade in an 8-year elementary school and in a junior high school where this transition involved moving to a new school. In comparison to the seventh graders who stayed in elementary school, the junior high schoolers had lower self-concepts, were less involved in activities and clubs, and perceived themselves as less integrated into their school and peer groups (Roeser et al., 2000). For preadolescents and adolescents, the onset of puberty, the start of dating, or some disruption in family life may make the burden of shifting to a new school especially heavy. Consistent with the concept of cumulative risk, Simmons and her colleagues (1987) found that children, especially girls, who were undergoing three or more transitions had lower self-esteem, participated less in extracurricular activities, and had lower grade-point averages.

COGNITIVE INTERVENTION STUDIES

As we have seen, a sizable number of factors contribute to a child's intellectual functioning. When some of these factors are negative and impede children's intellectual development, as well as their ability and motivation to use their intellectual powers to grow and prosper, can we alter them to improve a child's intellectual functioning? Cognitive intervention studies are designed to address this question.

Head Start and Similar Programs

Beginning in the 1960s, researchers and policymakers have implemented a great many programs aimed at modifying the development of learning-disabled or economically

deprived children. Some *preventive* programs were designed to prevent the decline in cognitive skills that was theorized to occur in preschool children who were relatively disadvantaged in society; other *interventionist,* or remedial, programs focused on school-age children who already had demonstrated learning difficulties. Some programs emphasized the teaching of specific skills such as counting or vocabulary, and others focused on teaching general problem-solving strategies, communication patterns, and principles of logical thought. Still others tried to alter such things as self-concept and achievement motivation. One of the best-known cognitive intervention programs is **Head Start**, a federally funded program for severely economically deprived preschoolers begun in 1965. This program is intended to provide 3- and 4-year-old children with daily preschool, and it originally included social services, medical care, and health education for the parents. However, funding cuts starting in the 1970s eliminated many of the parent services, and many eligible children cannot be accommodated in the preschool component in most areas.

Head Start A federally funded program that provides disadvantaged young children with preschool experience, social services, and medical and nutritional assistance.

Studies have shown that children have higher scores on IQ and other ability measures immediately after these programs end, whether the programs are preventive or interventionist (McLoyd et al., 2006). In the early grades, Head Start children show higher cognitive and social skills than similar children who have not participated in the program, but differences in IQ scores fade within a few years (Brooks-Gunn, 1995; Lee et al., 1990).

Some long-term studies have shown other effects that last well into adulthood, however. Compared with similar children who remained on the waiting list but did not participate in the program, Head Start children showed higher scores on achievement tests, they were more likely to graduate from high school and attend college, and they had higher earnings as adults (Barnett et al., 1992). Several other programs have shown similar results (Reynolds & Temple, 1998; Seitz, 1990; Seitz et al., 1985; Smith, 1995). One of the most successful has been the Carolina Abecedarian Project, featured in Box 10-2. It differs from Head Start in some important ways: It starts earlier, within the first year of life, and is more intensive, involving a full-day experience for the children that lasts from shortly after birth until the child starts school. Parent services are important components of the program and may be continued until the child is in grade three.

Characteristics of Successful Intervention Programs

The earlier intervention programs start and the longer they continue, the more successful they are likely to be (Ramey & Ramey, 1992, 2006). Table 10-6 lists seven principles on which the most effective intervention programs have been based. Children from impoverished settings who are not given early intervention efforts suffer a significant loss in both cognitive and social-emotional development during the second and third years of life (Blair et al., 1995). Moreover, it is not very likely that children can ever achieve a complete catch-up in these areas of development, although later intervention programs can effect some gains.

Intervention endeavors that focus on improving both the parent-child relationship and the family's natural support systems and that place the child in an educationally stimulating program are among the most successful (Hyson et al., 2006; Slaughter, 1988; Smith, 1995). Almost as successful are programs that involve low-income parents actively in their children's education (Powell, 2006). In some cases, mothers are employed as teaching aides in

These children in a Head Start program seem very interested in what the teacher is saying and showing them.

Table 10-6   Seven principles of successful early intervention programs

Principle	Description
1. Timing	Interventions should begin during the first 2 years of life and continue at least until children enter kindergarten, and they should engage families earlier rather than later.
2. Intensity	The more intensive the intervention—that is, the greater the number of hours per day, days per week, and weeks per year during which intervention activities take place—the more positive the program's effects, particularly in families in which parents have low education levels and during the first 5 years of the child's life.
3. Direct provision of learning experiences	Intervention programs that offer services directly to the child rather than through an intermediary, such as a parent or a home visitor, are more successful than others.
4. Breadth	The broader the spectrum of services provided and the more routes used to enhance children's development, the more successful the program.
5. Recognition of individual differences	Programs must recognize the varying needs of individuals. In the lives of poor families, myriad reasons may account for one individual's failure to do well; thus, individualization of treatment interventions is very important.
6. Environmental maintenance of development	Unless poor or at-risk children are supported in multiple domains of development beyond the preschool years, they will not develop the skills, motivation, health, and resources needed to succeed in school settings. Two-generation programs may, by helping parents, create the support system children need to make academic progress.
7. Cultural appropriateness and relevance of intervention strategies	To be valued, used, and incorporated into participants' everyday lives, interventions must be culturally relevant and welcome to family and child. Because individuals within cultures vary greatly, stereotyping cultures will lead to failure.

Sources: Based on Ramey & Ramey, 1998; Ramey et al., 1995; Ramey et al., 2006.

two-generation program
A program of early cognitive intervention that extends help to parents as well as to their children.

intellectual giftedness A characteristic defined by an IQ score of 130 or over; gifted children learn faster than others and may show early exceptional talents in certain areas.

mental retardation A characteristic defined by an IQ score below 70 together with difficulty in coping with age-appropriate activities of everyday life.

learning disabilities
Deficits in one or more cognitive processes important for learning.

preschool centers; in others, program staff visit mothers in their homes and instruct and support them in their educational activities with their children. Some successful programs offer support that stretches beyond the home and preschool environments. The goal of these **two-generation programs** is to support both parents and children as they try to improve their futures (Stipek & McCroskey, 1989). They enable parents to take advantage of community resources in furthering their own educations, getting job training and finding work, or strengthening family relationships and family functioning through supportive social relationships (Ramey et al., 2006; Smith, 1995).

BEYOND THE NORMS: GIFTEDNESS AND MENTAL RETARDATION

Children vary greatly in the rate and manner in which they learn. Some children are exceptionally talented, learning much faster than classmates, whereas others function at significantly lower intellectual levels than their peers. Traditionally, specialists in intelligence testing have held that an IQ score above 130 signals **intellectual giftedness**; a score below 70, coupled with difficulty in coping with age-appropriate activities of everyday life, indicates **mental retardation**. Finally, some children, many of whom have normal or even high intelligence levels, have specific difficulties that interfere with learning, such as speech or language impairments or reading disabilities like dyslexia. These children are identified as having **learning disabilities**. We look first at the evidence on giftedness and then at the contemporary view of retardation and the prospects for fulfilling lives for those who fall into this category. Then we examine children with learning disabilities.

The Intellectually Gifted

Do children who are intellectually gifted burst upon society, speaking when they're only a year old, solving problems in calculus at the age of 2? Not usually. Often, however, gifted children show special interests and talents quite early, and they apply themselves to these interests with enthusiasm and perseverance (Winner, 2006). But are the cognitive processes these children use unique or different from what other children use? Veronica Dark and Camilla Benbow (1993) suggest that the processes that underlie the cognitive feats of gifted children are not unique; it's simply that such children use their cognitive skills more efficiently than the rest of us. For example, gifted children seem to be able to process information more rapidly than others.

The question of how to educate and encourage exceptionally bright and talented children is controversial (Sternberg, 2006; Winner, 2006). Should these children be permitted to begin school early? Should they skip grades? Some argue that these sorts of steps are necessary to maintain an exceedingly bright child's interest and motivation. However, critics worry that these efforts may meet the child's intellectual needs at the expense of her social and emotional development, especially in terms of experiences and relationships with peers. Education alternatives for gifted children include enrichment programs, which attempt to provide these children with extra stimulation without advancing them to higher grades. In another type of program, the school sets up a special subject or activity meant to enrich the educational lives of a group of intellectually talented students—for example, a special class in science or social studies. A third type of enrichment program offers gifted students instruction in creative writing or foreign languages or opportunities for study in the arts, such as painting and dance. Although some argue that the "enrichment" offered by these types of program may be mostly busywork unrelated to the child's talent, enrichment programs influenced by Gardner's notion of multiple intelligences are increasing in number. These programs are designed to nurture the specific talents of gifted children (Moran & Gardner, 2006).

Children With Intellectual Deficits

We first encountered the problem of mental retardation in Chapter 2, where we discussed three specific disorders that are accompanied by serious intellectual deficits: Down syndrome, phenylketonuria (PKU), and fragile X syndrome. Down and fragile X syndromes, you'll recall, are chromosomal disorders, whereas the cause of PKU is lack of a specific enzyme for processing phenylalanine. Mental retardation that results from genetic causes or other factors that are clearly biological is referred to as *organic* retardation (Hodapp & Dykens, 2006). Intellectual deficits that derive from factors surrounding the birth process (e.g., lack of sufficient oxygen) and those that are the result of conditions of infancy or childhood (e.g., infections, traumas, or lack of nurturance) are considered *familial* retardation. In general, organic retardation is more severe than familial retardation.

Mental retardation is diagnosed by two basic measures: assessments of the child's mental functioning and of his adaptive behavior (American Association of Mental Retardation, 2002). Traditionally, an IQ score below 70, together with adaptive behavior deficits, has indicated mental retardation. Each of four IQ score ranges reflects an increasingly serious degree of retardation: mild mental retardation, IQ 55 to 70; moderate mental retardation, IQ 40 to 54; severe mental retardation, IQ 25 to 39; and profound mental retardation, IQ below 20 or 25. In addition, according to the guidelines of the American Association on Mental Retardation (2002), to be classified as mentally retarded, children must show deficits in their ability to function in the real world. Young children who can dress themselves, find their way around the neighborhood, and use the telephone, for example, are less likely to be identified as mentally retarded than children with the same IQs who do not exhibit these practical competencies.

BOX 10-2

Risk and Resilience

EARLY INTERVENTION WITH CHILDREN AT RISK

One of the most successful intervention efforts yet undertaken, the Carolina Abecedarian Project involves both day care and parent education (Campbell et al., 2001; Ramey et al., 1998; Ramey & Ramey, 2006). The Carolina program is a structured, cognitively and socially stimulating day-care program that focuses on developing children's communication skills as well as on intensive parent education. In one study within this program, a group of high-risk children began attending the preschool center, most by the age of 3 months, while a second, control group received no intervention. As Figure 10-8 shows, by the time the children in both groups were 12 months old, their cognitive performances had already begun to diverge. By the time the children were 4 years old, the IQ scores of those in the combined day-care plus parent-education (preschool intervention) group were some 13 points higher than the scores of those in the nontreated high-risk (control) group (Ramey et al., 1998).

When the children were between the ages of 2 and 4, the researchers classified some 40% of control-group children as mentally retarded (IQ 84 or below) but found that only 8% of the intervention-group children had IQs this low. The combined treatment program had prevented the deterioration in intellectual skills that ordinarily occurs by this age in such economically deprived, high-risk populations.

Lasting effects have been reported for this program. At age 15, children in the preschool intervention were

Average MDI or IQ score
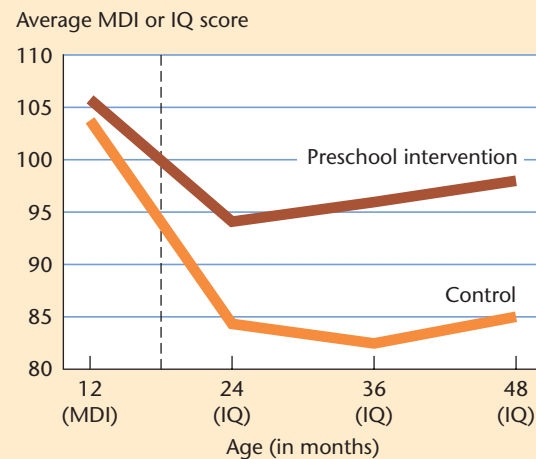
Figure 10-8

Early cognitive intervention works

The Carolina Abecedarian Project has produced significant gains in intellectual performance. At 12 months of age, the children in both the intervention and control groups received similar Mental Development Index scores on the Bayley scales, but their subsequent Stanford-Binet IQ scores were significantly different. When the two groups of children were 4 years old, the intervention group's average IQ score was some 13 points above the score for the control group, almost a full standard deviation. (The vertical dashed line marks the transition from Bayley scales to Stanford-Binet assessment measures.)

Source: Adapted from Ramey et al., 1998.

By far, the majority of people with mental retardation—some 95%—can learn and can hold jobs of more or less complexity and live in the community. Children with mild retardation (about 85% of all retarded children) usually acquire social and communicative skills during the preschool years and may be indistinguishable from other children until they reach their teens, at which time they may begin having difficulty with more advanced academic work. Children who are moderately retarded (about 10%) generally acquire communication skills in early childhood, and although they can benefit from vocational training, they are limited in their grasp of academic subjects. Young people in both of these groups may join the work force and live in supervised settings or, in some cases, independently. Children with severe retardation (3% to 4% of all retarded children) may learn to speak and communicate but have rarely progressed beyond reading a few words. Finally, children with profound retardation (1% to 2%) may learn communicative skills and some self-care. Both of the latter groups can learn to do some simple tasks with close supervision; young people in both these groups must live in supervised settings.

Whether the competencies of any or all of these groups of children with mental retardation can be improved is yet to be determined. As you will recall from Chapter

Children retained in grade (percent)
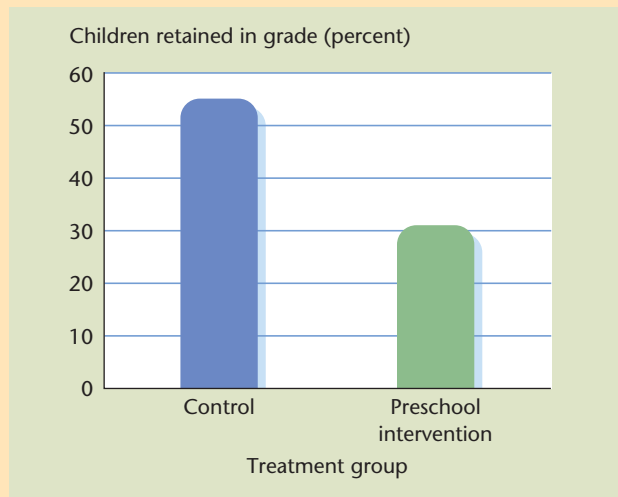
Figure 10-9

Early cognitive intervention has long-lasting effects

When the children in the original Carolina program reached 15 years of age, those who had been in the preschool intervention group were much less likely to have been retained in a grade than the children in the control group.

Source: Adapted from Ramey et al., 1998.

less often assigned to special education than controls and less often retained in grade, as Figure 10-9 shows. They had higher cognitive and academic achievement test scores in repeated testing from age 3 to age 21 (Campbell et al., 2001).

Ramey and his colleagues also randomly assigned some children to a later starting intervention involving family services in early elementary school, assigning others to both preschool and later interventions. They found that the children assigned to both interventions performed at the highest levels. Children who received only the preschool support were close behind, however, showing that the early program was more effective by itself than was the later one. However, those who received only the later program still achieved at higher levels than the controls who received no intervention at all (Campbell et al., 2001).

This project has reported the strongest and most durable positive effects of any early intervention program. The results are particularly meaningful because the intervention was a true experiment, in which children were randomly assigned to treatment and control conditions.

7, researchers at the Language Research Center in Georgia have succeeded in enabling nonspeaking youngsters with severe and moderate retardation to communicate intelligibly with adults and peers for the first time using a computerized keyboard device and have begun to explore the use of this device with 1.5- to 3.5-year-old children at risk for failure to develop language. And as we mentioned in Chapter 2, with caring parenting that includes extra stimulation and training, many children with Down syndrome can lead very productive lives (Hodapp, 2002).

Children With Learning Disabilities

Not all children learn at the same pace or in the same way. Some learn faster than their classmates, but others with various learning disabilities may learn more slowly. Of the more than 5 million U.S. children classified as disabled, a little more than 50% are considered learning disabled, about 20% have speech or language difficulties, about 9% are emotionally disturbed, about 12% are mentally retarded, and about 8% have various other kinds of handicaps (U.S. Department of Education, 1997). Children identified as

learning disabled are a very heterogeneous group in terms of the types of cognitive and social abilities they possess (National Joint Committee on Learning Disabilities, 1994). The diversity among children with learning disabilities makes it particularly difficult to know exactly what types of interventions are most useful for this group of children.

A major question in recent years has been whether these children with "special needs" should be placed in separate classes or integrated into regular classrooms. Many schools have adopted the approach of **inclusion** (also called *integration* or *mainstreaming*), in which children of all ability levels are included in the same classroom. Other schools have placed children with learning disabilities and other special needs in separate special education classes. The success of these different approaches is still being debated (Berninger, 2006). Some argue that inclusion programs enhance the academic achievement of children with learning disabilities (Buysse & Bailey, 1993), whereas others argue that such programs put children at risk for peer rejection or inappropriate labeling (Weissberg & Greenberg, 2006).

inclusion A policy by which children of all ability levels, whether learning disabled, physically handicapped, or mentally retarded, are included in the same classroom.

CREATIVITY

The nature of creativity and its relation to intelligence have long been of interest to psychologists. Some investigators, like Robert Sternberg, see intelligence and creativity as intertwined, but others, like Howard Gardner, see clear distinctions between the two. In this section, we look first at some of the definitions and theories of creativity and then at some evidence on the distinctions between creativity and intelligence. We then consider children's creative behaviors and conclude with some thoughts on how to encourage creativity in children.

Definitions and Theories

Defining creativity is just about as hard as defining intelligence; both are multifaceted qualities that vary as a function of personal characteristics (which are both inherited and learned), the context in which they are used, the risk factors that may inhibit them, and the environmental supports that may encourage and sustain them. The key to creativity is the notion of *uniqueness*. Most people—including most psychologists—would agree that the creative product is novel. In some way, it is unlike anything else in its class. But many authorities, such as Gardner (2006), also agree that a truly creative idea or product must be characterized by *usefulness*. It must be of benefit in some area of life, whether that be astrophysics, the visual arts (e.g., painting, sculpture), household products, literature, technology, music, or another field of human endeavor. And still others argue that knowledge is crucial. For instance, Keegan (1996) discusses how Charles Darwin amassed an enormous body of knowledge of natural history before he offered his ideas about evolution to the world.

Relationship Between Creativity and Intelligence

creativity The ability to solve problems, create products, or pose questions in a way that is novel or unique.

Are IQ and creativity related to each other? **Creativity** is defined as the ability to solve problems, create products, or pose questions in a way that is different (novel) from the approaches most other people use (Gardner, 2006). To explore the relation of creativity to IQ, Wallach and Kogan (1965) administered WISC subtests and other intelligence tests as well as a set of tasks designed to tap creative modes of thinking to a group of fifth graders. The researchers found only minimal correlations between "correct" answers on the intelligence tests and answers judged creative on the more open-ended

tasks. The results suggested that the intelligent person excels at *convergent thinking*, or thinking with the goal of recognizing or remembering specific information or solving traditional problems for the correct answers, and the creative person excels at *divergent thinking*, or thinking that is imaginative and seeks variety, novelty, and uniqueness. Thus, although highly creative people tend to be above average in intelligence, a higher IQ does not predict creativity (Gardner, 2006). Clearly, the true relationship between creativity and intelligence has yet to be determined. One thing people do agree on, however, is that both are desirable characteristics.

Are Children Creative?

According to some psychologists, very young children are not capable of true creativity. Although we know that children are capable of gathering significant bodies of knowledge, psychologists who specialize in creativity, such as Mark Runco (1996), hold that because young children often cannot distinguish between reality and fantasy, children cannot be truly creative until they reach preadolescence and can make this distinction. However, others point out that even though young children are not creative in the full sense of the term, their play—especially fantasy, or pretend, play—gives children a chance to practice the kind of divergent thinking that can lead them someday to invent new things or ideas (Moore & Russ, 2006; Russ, 2003). Vygotsky also thought that play facilitated creativity: "The child's play activity is not simply a recollection of past experience but a creative reworking that combines impressions and construct-forming new realities addressing the needs of the child" (1930/1967, p. 7).

If children may eventually be capable of creativity, are there ways that this creativity can be fostered or encouraged? Formal school instruction tends to focus on learning specific content, passing tests, and advancing in grade. According to Robert Albert (1996), a number of researchers have identified a period in middle childhood through preadolescence when early signs of creativity seem to disappear as children concentrate on well-organized (and thus well-controlled) learning skills. Divergent thinking simply does not have much opportunity to flourish in the classroom. However, outside school, parents can contribute by encouraging their children's creative impulses (Russ, 2003).
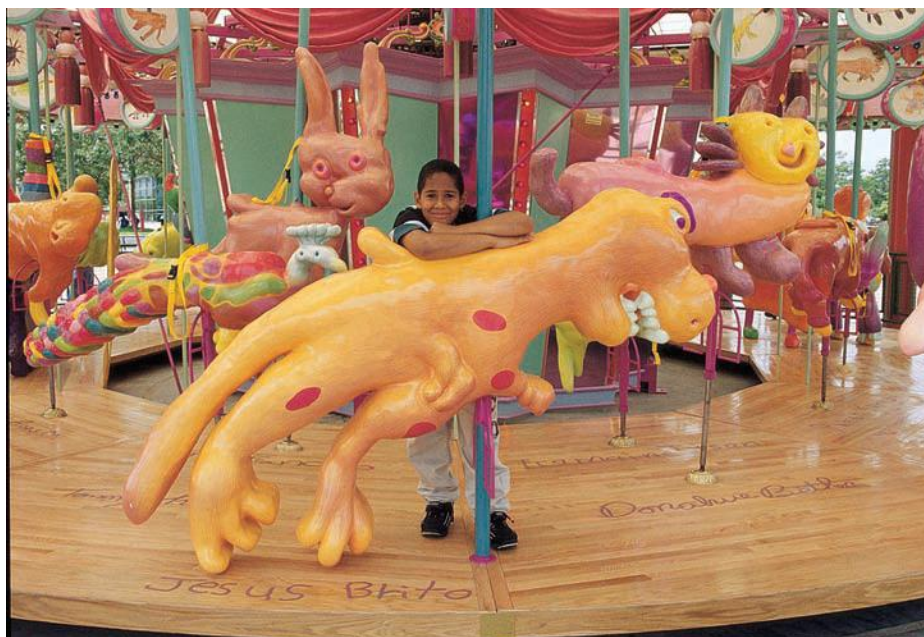
Jesus Brito smiles proudly above his lunging *Tyrannosaurus rex*, one of the Totally Kid Carousel's marvelous steeds that were all created by children. Mike Mottola, designer of the carousel, turned 36 of the 1,000 drawings submitted by first and second graders in New York City schools into mounts for this merry-go-round in the city's Riverbank State Park. Encouraging children's creative expression clearly can produce things that are unique and useful!

Making the Connections 10

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 10 and discussions in other chapters of this book.

Chapter 10
Intelligence and Achievement

Heredity plays a significant role in individual differences in IQ.
In Chapter 2, "Heredity and the Environment," pp. 63–64

Multiple intelligences may include emotional intelligence.
In Chapter 6, "Emotional Development and Attachment," p. 180

Creativity is linked with problem-solving abilities.
In Chapter 9, "Cognitive Development: The Information-Processing Approach," p. 337

SUMMARY

Theories of Intelligence

- It is generally agreed that intelligence is composed of multiple abilities and is not a single, general construct. **Factor analysis** has been instrumental in research leading to this view. Contemporary intelligence specialists have confirmed the existence of a general factor of cognitive ability, derived from Spearman's original **general factor (g)**. This modern middle-ground position, which also recognizes Spearman's concept of **specific factors (s)**, holds that children may vary both in overall intellectual power and in their proficiency in specific aspects of cognitive functioning.

- An information-processing approach to intelligence, Sternberg's **triarchic theory of intelligence** holds that intelligence is built on information-processing skills, experience with particular kinds of tasks and problems, and the abilities to adapt to a particular context and to shape others to one's needs.

- Gardner's **theory of multiple intelligences** suggests that each of eight kinds of intelligence has its own developmental path and is guided by different forms of perception, learning, and memory. Each type of intelligence is likely to characterize individuals with particular interests and endeavors, and a single individual may possess one or more types.

Testing Intelligence

- Specialists in intelligence testing have generally described intelligence by means of an **intelligence quotient (IQ)**. However, it is important to remember that what is measured on an IQ test is performance; capacity cannot be directly measured.

- Intelligence tests have three primary purposes: predicting academic performance, predicting performance on the job, and assessing general adjustment and health. Although traditional tests predict school performance fairly well, they have been criticized as unfair to minority groups, and efforts have been made to develop **culture-fair tests**.

- The widely used **Bayley Scales of Infant Development**, designed for infants and very young children, measure mostly sensorimotor abilities characteristic of certain developmental milestones and are generally used with children thought to be at risk of abnormal development. The **Fagan Test of Infant Intelligence** is designed to measure processing skills.

- The early intelligence test developed by Binet and Simon focused on verbal and problem-solving abilities. The **Stanford-Binet Test** is an adaptation of Binet's test.

- Binet developed the concept of **mental age**, an index of a child's performance level compared with her true age. Stern combined chronological age with mental age to create the intelligence quotient.

- The **Wechsler Intelligence Scales** (adult and child versions) are probably the most commonly used intelligence tests today. Their scoring is based on a **deviation IQ**, or the relation between an individual's score and the distribution of scores for the group of which she is a member.

- Emphasizing the processes of intelligence, the **Kaufman Assessment Battery for Children (K-ABC)** also attempts to be culture-fair. Examiners teach a child who fails an item how to solve it before moving on to the next item.

- **Psychometricians** establish **test norms** by administering a test to groups having particular characteristics, such as age. The stimuli, instructions, and scoring of test items are also carefully **standardized** so that the test procedures will be the same when administered by different people.

- Intelligence tests must have both **validity**—that is, the test measures what it claims to measure—and **reliability**—that is, the same score will be obtained for an individual across time or successive testings. IQ scores can and do fluctuate because they measure current performance rather than underlying ability. Early studies indicated that scores on intelligence tests during infancy were not predictive of later performance, but recent research suggests that measures of infant attention may be related to IQ in early childhood. After about age 8, prediction of intelligence becomes more accurate. The rate of mental growth varies among children, however, and major stresses or changes in life circumstances may temporarily disrupt cognitive performance.

Why Do People Differ in Measured Intelligence?

- Most estimates of the heritability of intelligence have indicated that 40% to 50% of the variability in intelligence among middle-class white Americans is due to genetic factors.

- Many psychologists continue to debate the heritability of intelligence, some holding that it is less than 50%, others that it is more. Arthur Jensen, the most extreme representative of the latter group, proposes two types of learning, both inherited—**associative learning** and **cognitive learning**. According to Jensen, all people share the first type of learning, but the second type is more prevalent among certain ethnic groups.

- When we estimate heritability among people within a specific cultural or ethnic group, our estimates will be higher because such people by definition share some characteristics that are both inherited and environmental. It is inappropriate to apply heritability indexes based on one group to members of another. In addition, because heritability estimates are based on specific groups of people, they yield average numbers; thus, they do not necessarily apply to an individual member of a group.

- Significant environmental factors that affect the child's intellectual functioning include events during pregnancy and the child's birth that can result in **congenital** defects as well as the interpersonal relationships that the child develops with family members, teachers, peers, and members of the community at large.

Ethnicity, Social Class, and Intellectual Performance

- According to those who hold that intelligence tests are biased against members of minority groups, the content of standard IQ tests is drawn from European American middle-class language, experience, and values and thus is inappropriate for other groups.

- Context is an important factor in children's intellectual performance. Testing conditions, such as unfamiliar surroundings and European American examiners, may negatively affect the performance of lower class and minority children.

- The concept of **cumulative risk** suggests that the more negative aspects of experience that are present in a child's life, and put the child at risk for unhealthy development, the more likely he is to score poorly on tests of intellectual skills.

- Varying styles of parent-child interactions in different social classes may influence a child's development of verbal and cognitive skills. Studies indicate that early differences in mothers' use of language and infants' attention to their mothers' speech may account for later differences in the use of verbal information.

- Research indicates that cultural differences in parents' attitudes and enthusiasm for education may affect children's performance on academic tasks. Chinese and Japanese students have been found to perform at a higher intellectual level, particularly in mathematics, than Asian American students who, in turn, score higher than European American, African American, and Latino American students. **Stereotype threat** may also interfere with the performance of ethnic minority youth on achievement tests.

Achievement Motivation and Intellectual Performance

- Children's intellectual performance is influenced by their own **achievement motivation**, the emotions they associate with learning tasks, the ways they view themselves and their abilities, and their responses to success and failure.

- In one approach to understanding achievement motivation, children who see themselves as helpless tend to give up easily or show deterioration when working on hard problems. In contrast, mastery-oriented children use failure feedback to maintain or improve their performance. Helpless children may hold an entity view of intelligence, whereas mastery-oriented children may hold an incremental view.

Cognitive Intervention Studies

- Since the 1960s, many intervention programs have been aimed at modifying the development of economically deprived children. One of the best-known and successful is **Head Start**, a federally funded program for preschool children who are severely deprived economically. In general, these programs have reported short-term gains in academic performance, though some others have reported a loss over time of the initial advances.

- Keys to long-term success may be involving children in these programs within the first 2 years of their lives, continuing intervention efforts at least until children enter kindergarten, and offering **two-generation programs**, in which educational, occupational, health, and counseling services are provided to the children's parents at the same time as intervention efforts proceed with the children themselves.

Beyond the Norms: Giftedness and Mental Retardation

- Whether or not to advance children who display **intellectual giftedness** to higher grades in school remains controversial, although some such programs have shown success. Although some voice concerns that accelerated advancement will isolate gifted young children socially, others hold that such children are generally advanced socially as well as intellectually.

- Some 95% of children with **mental retardation** can pursue academic studies to a greater or lesser degree, hold jobs, and as adults live either independently or in supervised settings. Only 4% to 6% of children with mental retardation must live under close supervision throughout their lives.

- More than half the children with special education needs are identified as having specific **learning disabilities** that interfere with cognitive processing in some way. Schools differ in terms of how these children are integrated into the classroom; some schools place children with learning disabilities in classes with normally functioning children, and other schools separate these children into special education classes.

Creativity

- The defining features of **creativity** are uniqueness and usefulness. The relationship between creativity and intelligence continues to be debated, but current theory suggests that the sources of creativity lie in intelligence and motivation as well as a willingness to meet challenges, overcome obstacles, and take risks.

- Because children lack the knowledge base required to evaluate true creative efforts, some psychologists believe that creativity begins in preadolescence. Others, however, hold that young children have novel ideas, engage in creative acts, and use play to practice divergent thinking. These psychologists believe that encouraging imaginative play in children may promote future creativity.

EXPLORE AND DISCUSS

1. How important is IQ? What do IQ tests predict, and what do they not predict?

2. Why do you think the overall IQ score has improved over the last century, as described in the Flynn effect?

3. How can schools be organized in a multicultural society to provide equal opportunity for all children to attain their academic potential?

4. Should government funds be spent on early intervention programs for children at risk for educational failure? Why or why not?

Faith Ringgold (b. 1930). *Tar Beach*, 1988.

Solomon R. Guggenheim Museum, New York.

11.

The Family

The family is both the earliest and the most sustained source of social contact for the child. What is a family? A family is a social unit in which the adult partners or spouses and the children share economic, social, and emotional rights and responsibilities as well as a sense of commitment or identification with each other. Even though many contemporary families have new and different structures, family relationships remain the most intense and enduring of all interpersonal and social bonds. Family members share not only their memories of the past but also their expectations of sharing future events and experiences. It is largely this continuity over time that makes the family relationship qualitatively different from the shorter lived relationships children have with playmates and friends, teachers, neighbors, and ultimately, coworkers. Children carry their memories of past family interactions in their perceptions and feelings about family members and in the standards they hold, not only for family behavior but also for the behavior of people in general.

In the child's earliest years, his sole interpersonal relationships may be with his parents, and parents generally present cultural beliefs, values, and attitudes to their children in a highly personalized and selective fashion. Clearly, parents' own personalities, family backgrounds, attitudes, values, education, religious beliefs, socioeconomic status, and gender influence the way they socialize their children. However, parents play a crucial role in this **socialization** process, ensuring that their child's standards of behavior, attitudes, skills, and motives conform as closely as possible to those regarded as desirable and appropriate to her role in society. We will see in the next several chapters that peers, schools, churches, the media, and other forces also contribute importantly to a child's socialization. From the moment of birth, however,

> whether the child is wrapped in a pink or blue blanket, swaddled and placed on a cradleboard . . . nestled in a mobile-festooned bassinet, indulged by a tender mother, or left to cry it out by a mother who fears spoiling the child, socialization has begun. (Hetherington & Morris, 1978, p. 3)

socialization The process by which parents and others ensure that a child's standards of behavior, attitudes, skills, and motives conform closely to those deemed appropriate to her role in society.

We begin this chapter by examining the family system from the ecological systems perspective that we described in Chapter 1. We explore the several subsystems of the family—including the relationships between and among marital partners, parents and children, and siblings—and examine how the family as a whole contributes to the child's socialization. We then look at the effects of social class, socioeconomic status, and ethnicity on the family and its role as socializing agent. In addition, we explore some of the major changes in the structure and functioning of the American family that have occurred in recent decades. In a majority of families today, both parents work outside the home, a change that can have important effects on children's development. In addition, there is enormous diversity in the way modern families are structured; some families are headed by a single and/or divorced parent, some families are blended by divorce and remarriage, and still other families are headed by gay or lesbian parents. In some families, partners are becoming parents at later ages; in other families, parents cherish adopted children. We also consider the development of children born to teenage parents who are often unwed mothers. We end the chapter with an examination of the causes and consequences of the tragedy of child abuse.

THE FAMILY SYSTEM

It's not uncommon for people to see socialization as a process by which parents modify children's behavior, but it would be more accurate to think of this phenomenon as a process of mutual shaping. That is, parents do indeed influence and direct their children, but their children also influence them and, in fact, play an active role in their own socialization (Bronfenbrenner & Morris, 2006; Kuczynski & Parkin, 2007). In a complex system in which members are interdependent, changes in structure or in the behavior of a single family member can affect the functioning of the entire system. Moreover, families do not function in isolation; they are influenced by the larger physical, cultural, social, and historical settings and events around them. And families are not static; they change over time. Every family member, from the youngest infant to the oldest adult, is changing all the time, and these changes are reflected in family relationships.

The Ecological Systems Perspective

The view of the family as an interdependent system that functions as a whole has two principal origins: the realization by psychotherapists that to change the behavior of a troubled child one usually must change the family system as well (Minuchin, 2002) and Bronfenbrenner's ecological theory. This position is concerned both with the relationships between the child and the many nested systems within which she develops as well as with the relationships among these systems themselves, from the familiar microsystem to the larger social and cultural setting of the macrosystem (Bronfenbrenner & Morris, 2006).

To refresh your memory, look back at Table 1-2 (Chapter 1), which used the family system to illustrate several important principles of systems theory. We learned there that a system is *complex* and *organized;* that it has an ongoing *identity* of its own; and that although it maintains a certain *stability* over time, it must also be capable of *morphogenesis,* adapting to changes both within the system and outside it. In addition, a system demonstrates *equifinality* as time goes by, developing many similarities with other systems like it, even though such systems (e.g., families in different cultures) may express these similarities in different ways.

In addition, we need to consider one or two other principles that govern system functioning. *Interdependence* explains why the functioning of the family system is not always smooth. Because each family member and family subsystem influence and are influ-

enced by each other member and subsystem, both coopera-
tive behavior and hostile or antisocial behavior may have
widespread effects on the system as a whole. Parents who
have a good relationship with each other are more likely
than not to be caring and supportive with their children,
and in turn the children are likely to be cooperative and
responsible. On the other hand, parents whose marriages
are unhappy may become irritable with their children, and
the children may exhibit antisocial behavior that may in
turn intensify problems in the parents' relationship.

Families tend to attain equilibrium, or *homeostasis,*
in their functioning and to become resistant to forces that
might alter this balance. This can be useful when routines
and rituals help establish a sense of family history, identity,
and tradition, making interactions easier and more com-
fortable. On the other hand, adaptability is the central cri-
terion of a well-functioning family; when family members
are unbending in the face of parental dissension or fam-
ily distress over an aggressive child, routines can solidify
and intensify negative patterns of interaction (Dishion &
Bullock, 2002; Katz & Gottman, 1997). In these circum-
stances, members may make no effort to communicate
rationally, defuse anger, protect others, or solve problems
and may become locked into a pattern of interaction that
promotes or sustains maladaptive behavior in one or more
family members. Resistance to change can prevent parents
or other family members from recognizing problems and
can cause members to blame all family difficulties on one
child, who becomes the target for everyone else.

Finally, families have *boundaries* that vary in how permeable or vulnerable they are
to outside influences. A well-functioning family tends to have permeable boundaries
that allow members to maintain satisfying relationships both within and outside the
family itself (Kerig, 2008). If families are too rigidly bounded, members may have
difficulty disengaging appropriately from the family as, for example, in adolescence,
starting college, marrying, or in time of need, making use of resources outside the fam-
ily. Such families may have few positive community contacts and social supports and
may be more likely than others to perceive their children negatively and be punitive and
inconsistent with them (Wahler & Dumas, 1987). On the other hand, families whose
boundaries are too permeable can be vulnerable to disruptions by external forces such
as intrusive in-laws or peer groups whose behavior is at odds with the family's own
standards.
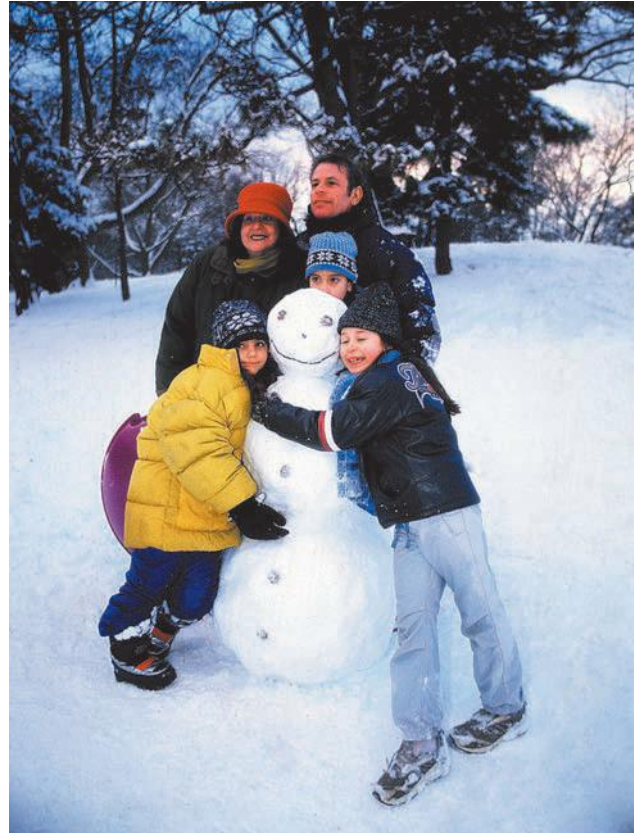
This family is clearly pleased
with their snowman. Such
shared activities can reinforce
family members' interdepen-
dence and increase positive
feelings among them.

The Marital System

Both partners in a marriage, or other form of committed relationship, make up the marital
system, the first and indeed the founding subsystem within the family system. Although
the marital relationship still predominates in contemporary society, there are now other
forms of committed arrangements between adult partners, such as civil unions and
cohabitation by domestic partners. Many of the principles that we will describe probably
apply equally to marital and other forms of stable couple arrangements. However, at this
time, we know considerably less about these newer relationships than about the more
traditional marriage. The nature of the partners' interpersonal relationship unquestion-
ably has an important impact on their children. Indeed, a relationship satisfactory to

both adult partners is often regarded as the cornerstone of good family functioning. Directly or indirectly, it facilitates good parenting, good sibling relationships, and the healthy development of all the family's children.

HOW DOES THE MARITAL RELATIONSHIP AFFECT CHILDREN?

As we've suggested, when partners offer each other emotional and physical support and comfort, the likelihood that they will provide the same kind of support and caring to their children is greatly increased. Research has shown that when partners are mutually supportive, they are more involved with their children, and their relationships with their children demonstrate affection, sensitivity, and competent child-rearing practices (Cowan & Cowan, 2002, 2008; Katz & Gottman, 1997).

Couples who share child care and household chores have more time for playful and pleasurable interactions with their children and increase their chances of witnessing developmental milestones like a child's first words or staggering steps. Moreover, children's academic, social, and athletic successes are more fun if involved partners share them. Couples who cooperate in caring for their children also help each other shoulder some of the special burdens new parents experience, such as 2 A.M. feedings, changing dirty diapers, and soothing a crying or sick child.

Conflict between partners, however, can have seriously negative effects on both parents and children (Cummings & Merrilees, 2008; Grych & Fincham, 2001). Even when a family's children are infants or preschool age, conflict between parents has been found to reflect insecure attachments of the children to both parents (Frosch et al., 2000) (also see Chapter 6). Studying school-age children, Katz and Gottman (1993, 1996) found that not only the level of conflict but also the way adult partners manage their conflict can have deleterious effects on a couple's children. Within families whose marital partners typically confronted conflicts with hostility, belligerence, and contempt, children tended to display more aggressive and acting-out behavior than other children. In addition, fathers who had an angry and withdrawn style of dealing with marital disputes had children who were more likely to be depressed than others.

The effect of marital conflict on children takes two pathways: direct and indirect (Cummings & Merrilees, 2008; Grych & Fincham, 2001). Children may be affected by such conflict *indirectly* when marital difficulties cause parents to change their child-rearing practices in unfamiliar ways. In the Katz and Gottman (1997) work, parents in conflicted marriages had a poor parenting style that was characterized as cold, unresponsive, angry, and deficient in providing structure and setting limits; the children of these couples tended to display a lot of anger and noncompliance in interacting with their parents. Children may also be affected *directly* by marital conflict when they are actual witnesses to arguments and fights. In a series of studies, Mark Cummings and his colleagues have shown children real or videotaped interactions between adult actors behaving like two parents in a home setting. For example, the actors might disagree about which movie to see or argue about who will wash the dishes. The more frequent and violent the conflict, and the more often the arguments were about something a child had done or said, the more likely the children were to show distress, shame, and self-blame (Cummings et al., 2002; Frosch & Mangelsdorf, 2001). Moreover, when the actors failed to settle their dispute, the children expressed more anger (Figure 11-1) and distress than when the actors resolved a conflict. Fighting in front of the kids has never been a good idea, but if partners handle their discussions constructively, showing respect for one another's opinions and expressing mutual warmth and support, they can reduce the harmful effects that their argument may have on their children. Moreover, they can model healthy conflict negotiation for their children.

Boys are much more susceptible to the negative effects of family disharmony than girls. Why should this be so? It seems that boys are more likely to be directly exposed to parental bickering and physical abuse than are girls (Hetherington & Stanley-Hagen, 2002). Parents quarrel more often and their quarrels are longer in the presence of their sons. If parents begin to disagree when daughters are present, they are more likely to
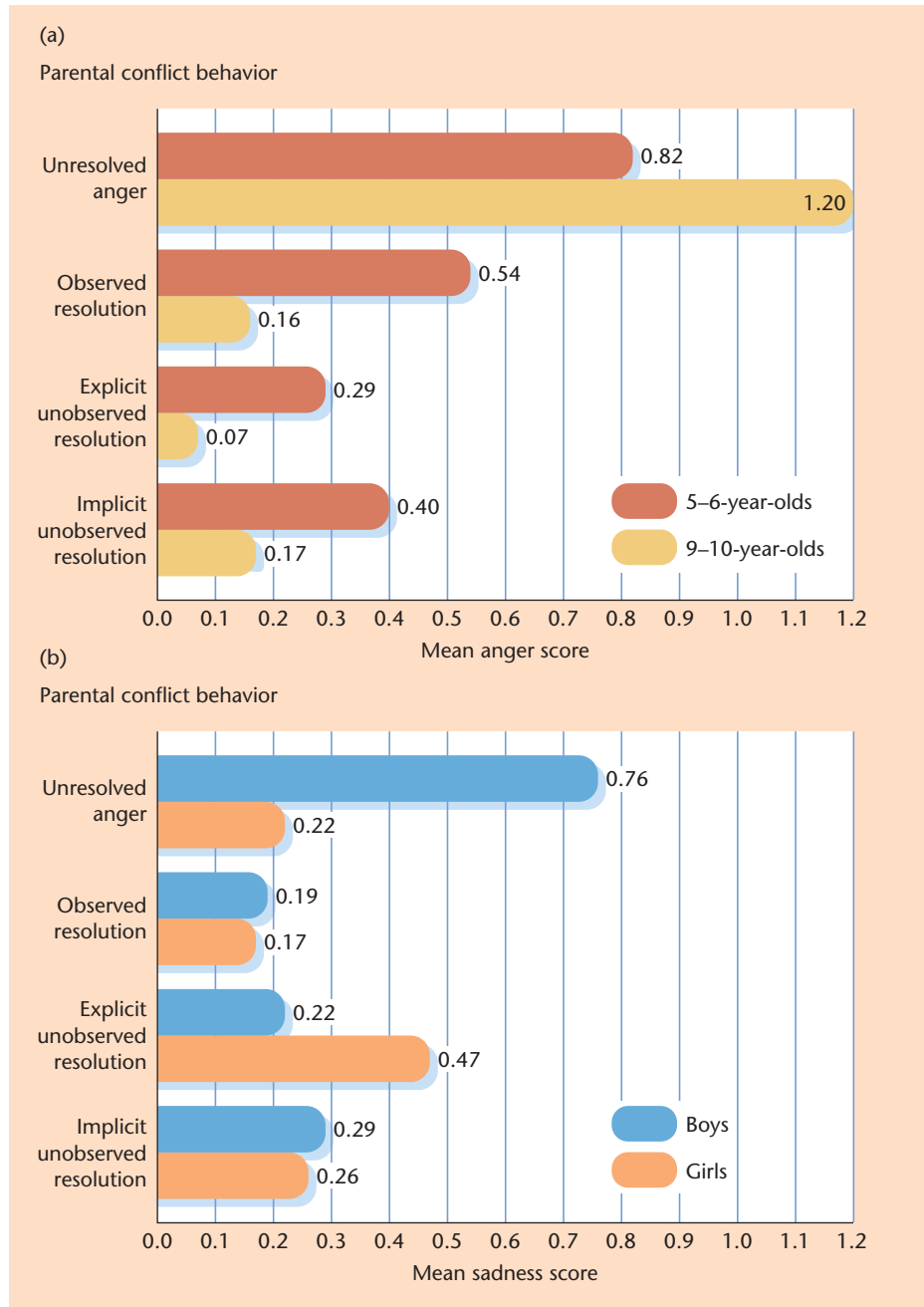
Figure 11-1

How children respond to parental conflict

Parents' failure to resolve an angry conflict was the most likely behavior to arouse children's anger and caused the most displays of anger in older children (a). Such a failure was also more likely to trigger sadness in boys, but girls were more likely to be sad when parents resolved a conflict out of their presence and made only a brief reference to it later (b).

raise their eyebrows, nod in the child's direction, and mutter, "We'll talk about this later." Parents are simply more protective of daughters than of sons.

IMPACT OF A NEW BABY ON THE MARITAL/PARTNER SYSTEM Just as the relationship between marital partners affects their response to their children, the presence and behavior of a child influence the marital relationship. The most immediate effect—especially after the birth of a couple's first child—is a shift toward a more traditional division of labor between husband and wife, even when the initial role arrangement was egalitarian (Cowan & Cowan, 2000). Despite the changes that have occurred in gender roles in recent years, an implicit assumption seems to be that the role of the mother with young children is in child care and homemaking, and the role of the father is in providing for the family (Parke, 2002). Rarely, a father will take

time from his job to be with his wife and newborn, but that time hardly ever exceeds 2 weeks. In families where both partners have worked outside the home, the wife is most likely to give up her job. Thus, not surprisingly, marital satisfaction declines more markedly in women than men after the birth of a couple's first child (Cowan & Cowan, 2000). Fathers' marital satisfaction also takes a dive but more slowly; it may be only gradually that men become aware of the restrictions a baby imposes on their lives and realize that they are no longer the central focus of their wives' attention. In general, mothers get more of the responsibilities of raising a child, but they also often have more of the pleasures (Coltrane, 1996).

Children can influence the relationship between their parents in other ways. For example, children who are temperamentally difficult or handicapped in some way often are the cause of heightened family stress that may translate into marital conflict. Couples who were satisfied with their relationship before the child's birth weather such pressures reasonably well, and their relationships show fewer disruptions than those of couples who were experiencing dissension before a child's arrival. Thus, although the presence of a difficult child may be enough to further undermine a fragile marriage (Hogan & Msall, 2002), the birth of a child rarely destroys a good marriage. However, because becoming parents does pose risks to a young family, intervention programs like that described in Box 11-1 have been designed to strengthen couple relationships and reduce the adverse consequences of the transition to parenthood.

The Parent-Child System

Most parents have some beliefs about the qualities they would like to see their children develop and the child-rearing methods that should encourage them. There are many paths to the development of positive as well as negative social behaviors, however, and there is no magic child-rearing formula. Parents have to try to adapt their methods to each child's temperament and needs and to the demands of the culture, but it's important to keep in mind that individual children may develop very differently within the same family situation (Grusec & Davidov, 2007). It is also important to remember that, as we saw in Chapter 3 (Box 3-3), even in adverse environments some children seem to be relatively resilient (Cicchetti & Toth, 2006; Luthar et al., 2000).

HOW PARENTS SOCIALIZE CHILDREN   Attachment between parent and infant, as we discussed in Chapter 6, forms the foundation for later family relationships. Although socialization begins at birth, it seems to become more conscious and systematic as the child achieves greater mobility and begins to use formal language. Parents cuddle and pet the child and praise her for all sorts of achievements that parents and society regard as desirable, such as learning to use a spoon, naming objects, and repeating new words. On the other hand, whereas up to now parents have accepted and even indulged a number of "cute" behaviors, all of a sudden the air rings with "No!" "Don't!" and "Stop!" as children climb out of their cribs, totter to the head of the stairs, and discover the grand fun that can be had with the pots and pans so conveniently stored in cabinets at their own level. Practicing their newfound motor skills and exploring the world about them become real trials when playpen bars restrain exploration and parents make serious attempts at toilet training.

In teaching their children social rules and roles, parents rely on several of the learning principles we discussed earlier. For example, they use *reinforcement* when they explain acceptable standards of behavior and then praise or discipline their children according to whether they conform to or violate these rules. Parents also teach their children by *modeling* behaviors they want the children to adopt. Recall Bandura's observational learning theory from Chapter 1. An important difference between these two approaches is that whereas parents knowingly use reinforcement techniques, observational learning may occur by chance. As a result, the modeled behavior may not always be what they

BOX 11-1

Child Psychology in Action

HELPING NEW COUPLES COPE WITH BECOMING PARENTS

Can a supportive intervention help parents cope better with the transition to parenthood? Philip and Carolyn Cowan (2000, 2008) designed a program to address this issue. From a group of 72 couples who were expecting their first babies and 24 other couples who had not yet decided whether to become parents, the researchers selected a third of the expectant couples to participate in a 6-month group intervention that concluded 3 months after the birth of the couples' babies. In weekly sessions, a clinically trained married couple encouraged the participants to raise any issues they were grappling with. Both wives and husbands described their dreams of creating an ideal family and talked about the families they grew up in and about the impending birth. Interestingly, everyone had trouble imagining what would happen after the baby was born.

As each couple's baby was born, the couples began bringing their infants to the group. It was only then that partners began to try to find their way through the common changes, problems, and conflicts people encounter in becoming a family. Who could give up what? Who would take responsibility for what? How could they keep the marital relationship fulfilling while dealing with the child's incessant demands? The researchers assessed family functioning, the quality of the marital relationship, parenting effectiveness, and parents' and children's adjustment in late pregnancy and when the baby was 6 months, 18 months, 3 years, and 5 years old.

At the 18-month follow-up, the effects of the intervention were encouraging. Compared with fathers in the nonintervention group, fathers in the intervention group were more involved and satisfied in parenting and reported less negative change in marital satisfaction, sexual relations, and social supports. In comparison to mothers in the nonintervention group, mothers in the intervention group saw their nonfamily roles—for example, as worker or student—as more important. Intervention mothers were more satisfied with the division of labor between themselves and their husbands and with their marriages overall; they were happier with their sexual relations, and they seemed better able to balance life stresses and social supports. In addition, at the 18-month and 3-year follow-ups, significantly fewer of the intervention couples were separated or divorced.

By the time the couples' children were in kindergarten, however, the positive effects of the early intervention had waned. Marital satisfaction was beginning to decline, and there were few differences between the intervention and nonintervention groups in either parenting style or children's adaptation. Early interventions clearly do not last forever. However, later findings from this research project indicated that another intervention (e.g., parent training to deal with problems unique to rearing toddlers) when the child was 2 could address some of the issues that led to later declines in marital satisfaction, to disruptions in family functioning, and to children's behavior problems. As new changes and challenges arise over the family life cycle, continued intermittent intervention focusing on new issues may be necessary to sustain good family functioning (Cowan & Cowan, 2008). Some family therapists have even suggested that, just as we go for regular medical checkups, we should go for regular checkups of family well-being to identify family problems and prevent them from escalating.

want to produce. Suppose a child sees a churchgoing, platitude-spouting, moralizing parent lie about his golf score, cheat on his income tax, bully his children, and pay substandard wages to his help. Do you think the child will emulate his parent's hypocritical words or his actual behavior? The "do as I say, not as I do" approach to socialization doesn't work.

Parents also manage aspects of their children's environment that will influence their social development. They choose the neighborhoods and home in which the child lives, decorate the child's room in a masculine or feminine style, provide the child with toys and books, and expose the child to television viewing. They also promote the child's social life and activities by arranging social events and enrolling the child in activities such as sports, art, music, and other social and skill enhancement programs (Ladd & Pettit, 2002; Parke & Buriel, 2006).

Warm and loving parents tend to have children who are secure, feel good about themselves, and return their parents' affection.

DIMENSIONS OF PARENTAL BEHAVIOR   Parenting patterns and styles tend to reflect two primary dimensions of behavior. The first revolves around emotionality: Parents may be warm, responsive, and child centered in their approach to their children, or they may be rejecting, unresponsive, and essentially uninvolved with their children and more focused on their own needs and wishes. The second dimension concerns the issue of control: Parents may be very demanding of their children, restricting their behavior, or they may be permissive and undemanding, pretty much allowing the child to do as he wishes. We discuss some aspects of these two dimensions and then consider four parental patterns of behavior to which they contribute.

Emotionality   Parental *emotionality* is crucial in the socialization process. When a parent is warm and loving, the child is likely to want to maintain the parent's approval and to be distressed at any prospect of losing the parent's love (Baumrind, 1991; Grusec & Davidov, 2007). If a parent is cold and rejecting, however, the threat of withdrawal of love is unlikely to be an effective mechanism of socialization. From such a parent, what has the child to lose? Physical punishment, too, is more effective in the hands of warm parents, again probably because the child wants to conform to his parents' standards. But the child also knows from experience that his parents are involved and concerned with his well-being and that they will give him information about socially acceptable alternative behaviors. The child with rejecting parents has no such expectation. It is easier to learn the rules of the game if someone not only tells you what they are but also explains why you should play that way (Holden, 1997; Holden & Hawk, 2003).

Warmth and nurturance are likely to be associated with parental responsiveness to the child's needs. Loving parents make children feel good about themselves, dispelling anxiety and building their sense of security and their self-esteem. Children with such parents are more likely to learn and to accept and internalize parental standards than children of rejecting parents (Kochanska & Murray, 2000). The high levels of tension and anxiety likely to be associated with hostile parents and frequent physical punishment may make it very difficult for the child to learn the social rules the parent is attempting to teach.

Control   The goal of socialization is to enable the child eventually to *control* her own behavior and to choose socially responsible alternatives. Although the process of social-

ization does involve mutual influence between parents and children, the parent usually has more control than the child in interactions. Two kinds of control have been identified: behavioral control and psychological control (Barber, 2002). Behavioral control involves setting reasonable rules and parental use of suggestions, reasoning, and possible alternative courses of action as well as monitoring of children's activities. When moderate levels of behavioral control (consistency of discipline, use of the minimum amount of pressure necessary to change the child's behavior, and encouragement for the child to view his compliance as self-initiated) are used, children are more likely to cooperate and to adopt or internalize their parents' standards (Barber & Harmon, 2002; Holden & Hawk, 2003) than when parents are either overly controlling or lax and permissive. Psychological control involves the use of emotion-directed tactics such as guilt or shame induction, withdrawal of love or affection, or ignoring or discounting a child's feelings. Use of this type of control often leads to lower self-esteem, higher anxiety, and possibly, depression (Barber & Harmon, 2002).

Age plays an important role in children's responses to discipline. As children grow older, they resist being controlled and manipulated by others, and self-reinforcement for appropriate social behavior becomes increasingly important. Even older preschool children try to negotiate with their parents.

Child: I'll do it after I finish my painting. All right?

Parent: How about if you and I do it together?

As the child gains in social and cognitive competence and becomes more autonomous, parents rely increasingly on reasoning, and the child engages more and more in active bargaining (Kuczynski & Parkin, 2007). This gradual shift from control by parents and others to self-control becomes critical for the child as he begins to spend time out of the home. Parents' opportunities to monitor and control the child's activities directly decline markedly in the elementary school years and even more in adolescence (Mounts, 2000).

Fortunately, over the school years, children become more able to substitute long-term rewards for immediate gratification and are more oriented toward the welfare of others. Older children's more efficient information-processing skills improve their ability to interpret events, to consider their motives and those of others, and to weigh alternative outcomes. For this reason, using immediate rewards or punishments to control behavior is much more effective with younger than with older children (Maccoby & Martin, 1983). Parents' effectiveness as agents of socialization is determined ultimately by a mix of factors: their emotional relationship with the child, the types of controls they try to use, and the appropriateness of these controls to the child's age and personality and the demands of the particular situation.

PARENTING STYLES   Family systems theorists would argue that what is important in a child's socialization is not any particular parental dimension of behavior but the overall combination of these behaviors. The four parenting styles shown in Figure 11-2—authoritative, authoritarian, permissive, and uninvolved—are composed of different combinations of the warm-responsive/rejecting-unresponsive and the restrictive-demanding/permissive-undemanding dimensions that we've discussed. They also reflect research that has explored the relationships between each parenting style and children's emotional, social, and cognitive development. In a now-classic study, Baumrind (1967) linked the first three of these styles with specific and quite distinctive patterns of children's interactions with their parents. Maccoby and Martin (1983) extended the Baumrind typology, adding the fourth, uninvolved, parenting style.

Baumrind (1967, 1991) identified three parenting styles based on parental interviews and observations of parents interacting with their children both at home and in the laboratory. These styles are shown in Figure 11-3; in turn, she observed the children in preschool and again in adolescence to discover the links between parental styles and child

Figure 11-2

Parenting styles

Although recent multicultural and cross-cultural studies suggest that these four parenting styles are not universally applicable, the essential characteristics and qualities on which they were based remain valid measures of behavior in many settings. New research may further refine these categories and add qualifying information based on cultural variations.

Source: From *Handbook of Child Psychology*, 4 (E. M. Hetherington, Ed.), by Maccoby, E. E. and Martin, J. A., "Socialization in the context of the family: Parent-child interaction." Copyright © 1983 by John Wiley & Sons, Inc. Reprinted with permission of John Wiley & Sons, Inc.

	Emotionality	
	Warm, responsive	Rejecting, unresponsive
Restrictive, demanding	Authoritative	Authoritarian
Permissive, undemanding	Permissive	Uninvolved

Control

authoritative parenting
Parenting that is warm, responsive, and involved yet unintrusive and in which parents set reasonable limits and expect appropriately mature behavior from their children.

authoritarian parenting
Parenting that is harsh, unresponsive, and rigid and in which parents tend to use power-assertive methods of control.

permissive parenting
Parenting that is lax and in which parents exercise inconsistent discipline and encourage children to express their impulses freely.

uninvolved parenting
Parenting that is indifferent and neglectful and in which parents focus on their own needs rather than their children's needs.

behavior patterns. **Authoritative parenting** was correlated with the behavior of energetic-friendly children, who exhibited positive emotional, social, and cognitive development. Authoritative parents were not intrusive and permitted their children considerable freedom. At the same time, they imposed restrictions in areas in which they had greater knowledge or insight, and they were firm in resisting children's efforts to get them to acquiesce to their demands. In general, warmth and moderate restrictiveness, with the parents expecting appropriately mature behavior from their children, setting reasonable limits, but also being responsive and attentive to their children's needs, were associated with the children's development of self-esteem, adaptability, competence, internalized control, popularity with peers, and low levels of antisocial behavior. Authoritative parenting continued to be associated with positive outcomes for adolescents, as it was with younger children; responsive, firm parent-child relationships were especially important in the development of competence in sons.

In contrast, **authoritarian parenting** was linked with the behavior of conflicted-irritable children, who tended to be fearful, moody, and vulnerable to stressors. These parents were rigid, power-assertive, harsh, and unresponsive to their children's needs. In these families, children had little control over their environment and received little gratification. (See Chapter 14 for further discussion of punishment as a disciplinary tactic.) Baumrind proposed that these children often felt trapped and angry but also fearful of asserting themselves in a hostile environment. Authoritarian child-rearing had more negative long-term outcomes for boys than for girls. Sons of authoritarian parents were low in cognitive and social competence. Their academic and intellectual performance was poor. They were unfriendly and lacked self-confidence, initiative, and leadership in their relations with peers.

Finally, **permissive parenting**, although it produced affectionate relationships between parents and children, was correlated with children's impulsive-aggressive behavior. Excessively lax and inconsistent discipline and encouragement of children's free expression of their impulses were associated with the development of uncontrolled, noncompliant, and aggressive behavior in children. Figure 11-3 summarizes Baumrind's findings on some major dimensions of parents' behaviors; parents of the energetic-friendly children scored highest on all these dimensions during home (see Figure 11-3) as well as in the lab observations.

The fourth type, **uninvolved parenting**, identified by Maccoby and Martin (1983), characterized parents who were indifferent to or actively neglected their children and were "motivated to do whatever is necessary to minimize the costs in time and effort of interaction with the child." (p. 48) Uninvolved parents are parent centered rather than child centered; they focus on their own needs. Particularly when a child is older, these parents fail to monitor the child's activity or to know where she is, what she's doing, or
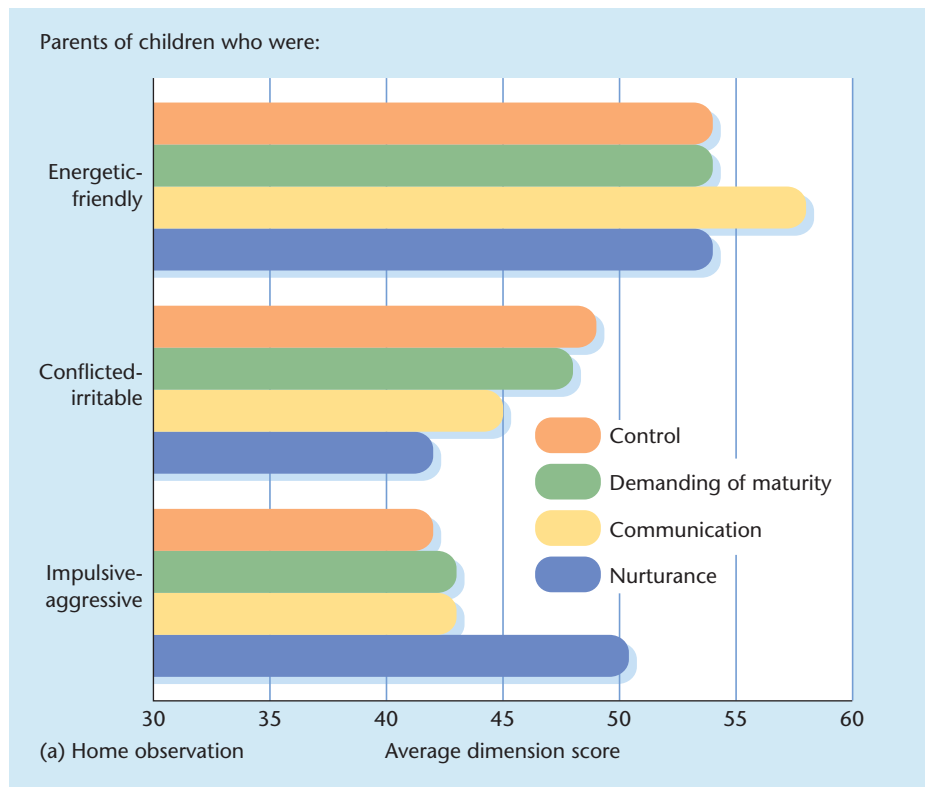
who her companions are. This parenting pattern is sometimes found in mothers who are depressed (Goodman & Gotlib, 2002) and in people under the stress of such things as marital discord or divorce (Hetherington & Kelly, 2002). Their own anxiety and emotional neediness may drive some parents to pursue self-gratification at the expense and neglect of their children's welfare (Patterson & Capaldi, 1991). Table 11-1 summarizes the characteristics of parents who display the four parenting styles as well as the kinds of behaviors the children of each group of parents manifest.

Parental involvement plays a crucial role in the development of both social and cognitive competence in children. In infants, lack of parental involvement is associated with disruptions in attachment (Thompson, 2006), and among preschool-age children, poor monitoring combined with coercive discipline predicted conduct problems in African American boys and girls at age 6 (Kilgore et al., 2000). In older children, it is associated with impulsivity, aggression, noncompliance, moodiness, and low self-esteem (Baumrind, 1991). In a kind of "double whammy," children of uninvolved parents tend not only to be socially incompetent, irresponsible, immature, and alienated from their families but also show disruptions in cognitive development, achievement, and school performance (Baumrind, 1991; Hetherington & Stanley-Hagen, 2002). Adolescents and young adults whose parents are uninvolved are likely to be truant, to spend time on the streets with friends whom the parents dislike, to be precociously sexually active, to have drinking problems, and to be delinquent (Dishion & Bullock, 2002).

CHALLENGES TO THE PARENTING STYLES APPROACH   Other investigators have challenged the parenting style approach, asserting that more research is needed on several fronts. First, some have suggested that we need to identify more clearly the components of each style that contribute to its relative effectiveness or ineffectiveness with respect to the child's development. Second, some authorities propose giving greater attention to how much the child's temperament and behavior influence the parents' style (Bates & Pettit, 2007; Kochanska, 1997). Finally, recent work has

Table 11-1　Relation between parenting styles and children's characteristics

Parenting Style	Children's Characteristics
Authoritative Parent	*Energetic-Friendly Child*
Warm, involved, responsive; shows pleasure and support of child's constructive behavior; considers child's wishes and solicits her opinions; offers alternatives	Cheerful
	Self-controlled and self-reliant
	Purposive, achievement oriented
Sets standards, communicates them clearly, and enforces them firmly; does not yield to child's coercion; shows displeasure at bad behavior; confronts disobedient child	Shows interest and curiosity in novel situations
	Has high energy level
Expects mature, independent, age-appropriate behavior	Maintains friendly relations with peers
Plans cultural events and joint activities	Cooperates with adults; is tractable
	Copes well with stress
Authoritarian Parent	*Conflicted-Irritable Child*
Shows little warmth or positive involvement	Moody, unhappy, aimless
Does not solicit or consider child's desires or opinions	Fearful, apprehensive; easily annoyed
Enforces rules rigidly but doesn't explain them clearly	Passively hostile and deceitful
Shows anger and displeasure; confronts child regarding bad behavior and uses harsh, punitive discipline	Alternates between aggressive behavior and sulky withdrawal
Views child as dominated by antisocial impulses	Vulnerable to stress
Permissive Parent	*Impulsive-Aggressive Child*
Moderately warm	Aggressive, domineering, resistant, noncompliant
Glorifies free expression of impulses and desires	Quick to anger but fast to recover cheerful mood
Does not communicate rules clearly or enforce them; ignores or accepts bad behavior; disciplines inconsistently; yields to coercion and whining; hides impatience, anger	Lacks self-control and displays little self-reliance
	Impulsive
	Shows little achievement orientation
Makes few demands for mature, independent behavior	Aimless; has few goal-directed activities
Uninvolved Parent	*Neglected Child*
Self-centered, generally unresponsive, neglectful	Moody, insecurely attached, impulsive, aggressive, noncompliant, irresponsible
Pursues self-gratification at expense of child's welfare	
Tries to minimize costs (time, effort) of interaction with child	Low self-esteem, immature, alienated from family
Fails to monitor child's activity, whereabouts, companions	Lacks skills for social and academic pursuits
May be depressive, anxious, emotionally needy	Truancy, association with troubled peers, delinquency and arrests, precocious sexuality
Vulnerable to marital discord, divorce	

Sources: Baumrind, 1967, 1991; Hetherington & Clingempeel, 1992; Maccoby & Martin, 1983.

raised serious questions about the generalizability of these styles across either socio-economic or ethnic/cultural groups (Chao, 1994, 2001; McLoyd et al., 2008). There are two primary issues: Do all groups use the parenting styles we've identified to the same degree, and are the advantages and disadvantages of each style for the child's development similar across groups? The answer to both of these questions seems to be no.

For one thing, neighborhoods make a difference in children's development, not only by confronting them with physical and social challenges that may or may not be beneficial but also by determining the kinds of socialization strategies parents adopt (Leventhal & Brooks-Gunn, 2000). For example, although an authoritative child-rearing style may promote social and academic competence in children living in low-risk environments

BOX 11-2

Perspectives on Diversity

PARENTAL CHILD-REARING STYLES CARRY DIFFERENT MEANINGS IN DIFFERENT CULTURES

There may be more than one explanation of why Asian American students outstrip European American and other cultural groups in academic performance. As we discuss elsewhere, Steinberg and his colleagues (1991, 1992) have proposed that the character of the peer groups with whom Asian and other students identify and socialize makes the difference; Asian students on average are more supportive of academic achievement. According to Ruth Chao (1994, 2001), however, other much earlier factors in children's lives may also be at work. It seems likely that the supportive Asian peer group is reflecting a kind of child-rearing that has no real U.S. equivalent.

In response to the finding that Chinese parents score high on U.S. psychologists' "authoritarian" scales, Chao points out that *authoritarian* does not mean in Chinese what it means in English. Thus, when Chinese parents get such high scores, they may be expressing behavior patterns that are quite different from the U.S. patterns that illustrate this concept. Moreover, this culturally based difference may hold also for parents from other Asian cultures who espouse such Confucian principles as family unity and respect for elders and may help explain why Asian American students typically do better in school than other U.S. students. (Confucius was a Chinese philosopher of the sixth to fifth centuries B.C. whose system of ethical precepts informs modern-day Confucianism.)

Whereas the American concept of authoritarianism subsumes many quite negative beliefs, attitudes, and behaviors (see Table 11-1), the Chinese style of parenting characterized by the concepts of *chiao shun* ("training") and *guan* ("to govern") requires a high degree of involvement with the child, physical closeness to the child, and devotion—mainly by the mother—of a great amount of time and effort. These concepts subsume teaching or educating children, focusing particularly on children's performance in school (for it is the Chinese belief that education is the key to success), and also connote "loving" and "caring for" the children. In this sense, these notions are antithetical to the concept of authoritarianism as it is defined in Western society. As Chao (1994) suggests, the seemingly restrictive behaviors that cause Asian parents to get high scores on Western scales may be equated with parental concern, caring, and involvement, and Asian parental control may reflect a more organizational effort designed to keep the family running smoothly and to foster family harmony.

It seems likely that the Chinese concepts of *chiao shun* and *guan* may actually resemble authoritativeness more than authoritarianism. The major difference between Chinese and Western concepts is the U.S. emphasis on soliciting the child's opinions, considering her wishes, and offering her alternatives (Table 11-1). As Chao (2001) points out, the Chinese notion of the self does not emphasize independence and autonomy, as the Western notion does. Instead, it derives from the Confucian notion of *jen* ("humanity" or "humankindness"), which holds that human beings are bound to one another and defined by their relationships with one another. For Chinese—and many other Asian—parents, adhering to social rules of conduct and interaction and developing a sensitive knowledge of others and their expectations are more crucial than focusing on the free expression of internal attitudes, feelings, and thoughts. Whereas the Western child is socialized to achieve according to some internalized standards of excellence, the Chinese child is encouraged to achieve according to family and social norms and expectations (Chao, 1995, 2001). These studies underscore the importance of recognizing how different cultures interpret various child-rearing practices.

To return to the suggestion by Steinberg and his colleagues that peer group support explains why Asian students excel in school despite their "authoritarian" upbringing, it is just possible that the peer groups are reflecting the *chiao shun* and *guan* that these peers have received from their parents. In effect, then, they support a given child's motivation and endeavor to achieve because they have the same parent-taught motivation and belief in hard work.

(Baumrind, 1991; Steinberg et al., 1992), it may not work in other situations. Several studies have found that poor minority parents who used more authoritarian child-rearing practices, especially those who lived in dangerous neighborhoods, had better adjusted children than those who relied on authoritative strategies (Furstenberg et al., 1999; Parke et al., 2008). Parental social integration into the neighborhood may also be an important

predictor of more adequate parenting practices (Furstenberg et al., 1999; Steinberg, Darling, & Fletcher, 1995). The more socially integrated the parents, the more vigilant they may be about their children's behavior, although this probably holds true only when families reside in neighborhoods where "good parenting" is the norm.

In Chinese families, a style of child-rearing that may appear to be authoritarian is quite common, but some have argued that there are major differences between the U.S. and Chinese conceptions of *authoritarian* and that the application of such a style to Chinese parents may be ethnocentric and misleading (Box 11-2). According to Ruth Chao (1994, 2001), the child-rearing styles described here reflect a U.S. perspective that emphasizes an individualistic view of childhood socialization and development; we revisit Chao's views in the section on cultural patterns in child-rearing. Similarly, Rudy and Grusec (2006) found no links between authoritarian parenting and negative feeling about the child or lack of warmth in Middle Eastern families in Canada, but the ties between this style and negativity and low warmth were evident for Anglo Canadian parents. Moreover, authoritarian style was associated with higher child self-esteem for Middle Eastern but not Anglo children. In summary, it is important to consider contextual and cultural issues in developing new concepts of parenting styles.

The Coparenting System

coparenting Parenting in which spouses work together as a team, coordinating their child-rearing practices with each other; coparenting can be cooperative, hostile, or characterized by different levels of investment in the parenting task.

Although parents often act separately in dealing with a child, mothers and fathers sometimes *coparent* as a team. **Coparenting**, in which spouses coordinate their child-rearing practices with one another, ideally working as a team, can take many forms. In families where parents' coparenting patterns reflect warmth, cooperation, cohesion, and child centeredness, there may be a high degree of family harmony (McHale, 2008; McHale et al., 2002). On the other hand, parents who are hostile may actively compete against one another, and in some cases, spouses may invest different amounts of time and energy in the parenting task, leading to an imbalance between the amount of involvement each parent displays with the child. These different coparenting patterns have been observed across a range of studies with infants, preschoolers, and school-age children and in both European American and African American families (Brody et al., 1998; Fivaz-Depeusinge & Corboz-Warner, 1999).

Gatekeeping is one form of coparenting in which one parent limits or controls the other parent's level of participation. For example, if a mother assumes that women are biologically more fit for parenting than men, she may set up subtle barriers that limit the father's involvement in the care of an infant (Beitel & Parke, 1998). There are clear links between early coparenting dynamics and later indexes of a child's social adaptation. McHale and Rasmussen (1998) found that hostile-competitive coparenting during infancy was related to aggression in children. When there were large discrepancies between the input of each parent, parents rated children as displaying anxiety. Other investigators have found links between problematic family alliances in the first year and insecure mother-child attachments and, in the preschool years, behavior problems, such as acting-out or withdrawal (McHale, 2008). As Figure 11-4 illustrates, the impact of the coparenting subsystem on children is independent of the effects of either the parent-child relationship or the marital relationship. This suggests that coparenting makes a unique contribution to children's development.

The Sibling System

Over 80% of U.S. families have more than one child, and the number, gender, spacing, and relations among a family's children affect the functioning of the entire family unit. These factors affect not only parent-child interactions but also the relations among *siblings,* or sisters and brothers. In fact, most children probably spend more time in direct interaction with their siblings than with their parents or other people significant
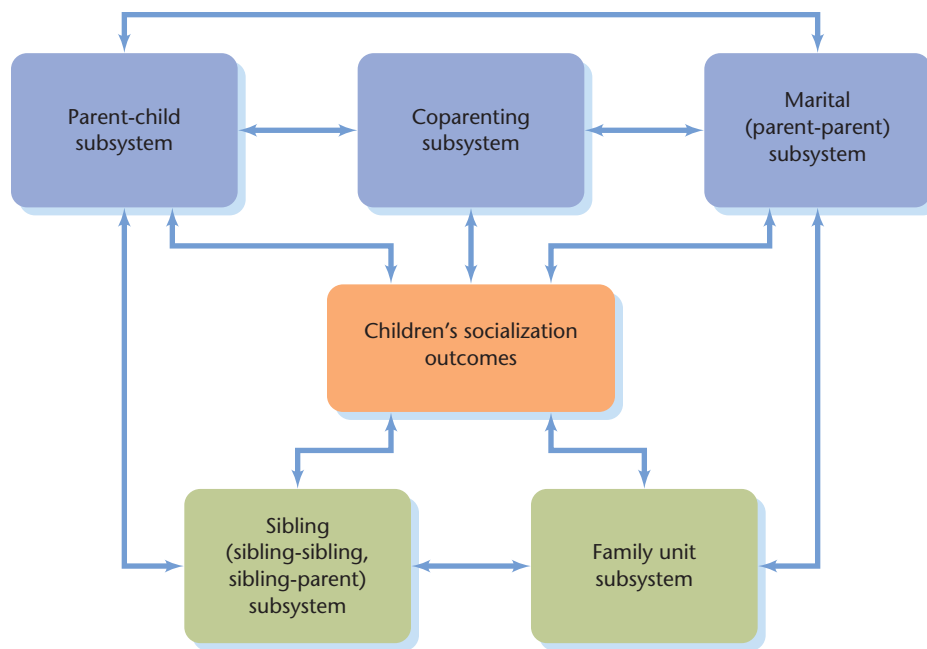
Figure 11-4

Family systems and children's socialization

This model proposes that the family unit itself is a subsystem of the overall family system with as important an influence on children's socialization as the influence wielded by parent-child, marital, coparenting, and sibling subsystems.

Source: From *Handbook of Personal Relationships*, 2nd ed. (S. Duck, Ed.) by Parke, R. D. and O'Neil, R., p. 56. © 2000 John Wiley & Sons Limited. Reproduced with permission.

in their lives (Dunn, 2007; Larson & Verma, 1999). Interactions between siblings provide plenty of opportunities for learning about positive and negative behaviors, and the emotional intensity of these exchanges may be greater than that of exchanges with other family members and friends (Katz, et al., 1992).

HOW ARE SIBLINGS AFFECTED BY BIRTH ORDER? A child's position in the family—that is, whether he is the firstborn or a later born child—affects him, his siblings, his parents, and the interactions among all family members. Each child's experience is different, but the experience of the firstborn child is unique. He is the only child who reigns supreme in the love and attention of his parents until he is displaced by the birth of a new baby, with whom he now must share his parents' affection. The only child, of course, enjoys his parents' exclusive attention all his life. Firstborn children are generally more adult-oriented, helpful, and self-controlled than their siblings, and they also tend to be more studious, conscientious, and serious and to excel in academic and professional achievement (Herrera et al., 2003; Zajonc & Mullally, 1997) (see Figure 11-5). Indeed, firstborns are overrepresented in Who's Who and among Rhodes scholars and eminent Americans in the fields of letters and science!

Interestingly, however, research has found that second-born sons support innovative theories in major scientific controversies related to such issues as evolution, whereas firstborn sons support the status quo (Sulloway, 1995). It may be that the greater expectations and demands parents typically place on their firstborns are responsible for some other, less desirable characteristics of firstborns. For example, they tend to be more fearful and anxious than their siblings, to experience more guilt, to have more difficulty coping alone with stressful situations, to be admitted more often to child guidance clinics, and to have less self-confidence and social poise.

Although the only child has sometimes been called a "spoiled brat," research findings suggest that in many ways the only child has advantages over other children, especially children in families with three or more siblings. An only child is exposed to the same high level of parental demands as other firstborns but does not have to adapt to displacement and competition with siblings. Like firstborns, the only child tends to be a high achiever, sustained by her close relationship with her parents, but she tends to be less anxious and to show more personal control, maturity, and leadership (Falbo &

(a)

Years of schooling

(b)

Occupational prestige
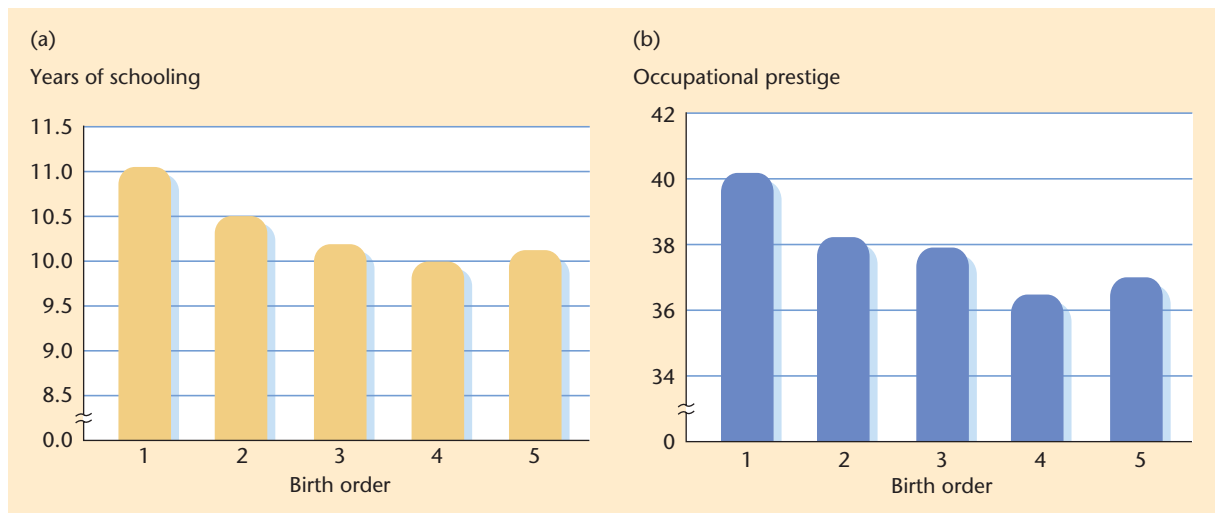
Figure 11-5

Birth order and academic and occupational achievement

This research showed a clear positive relationship between a person's rank in the family and her degree of achievement in academic endeavors and in working or professional life.

Source: Adapted from Herrera et al., 2003.

Polit, 1986). In social relations both outside and inside the home, an only child seems to make more positive adjustments than a child who is involved in sibling rivalry.

BIRTH ORDER, PARENT-CHILD, AND SIB-SIB INTERACTIONS

As expected based on family systems theory, introducing a new sibling into the family mix changes the dynamics of relationships among family members. The parents, to a great extent, determine whether the firstborn child will find seriously distressing the changes wrought by the arrival of a sibling (Dunn, 2007; Teti, 2002). If a mother continues to be responsive to the needs of the older child and helps him to understand the feelings of the younger child, intense sibling rivalry is unlikely to occur (Howe & Ross, 1990). And if a father becomes increasingly involved with his firstborn child, this can also counter the child's feelings of displacement and jealousy. In fact, one positive effect of the birth of a second child may be that a father participates more in child care (Kramer & Ramsburg, 2002; Parke, 2002). Parents can help prepare their children for the arrival of a new sibling. Bringing the older sibling to visit mother and new baby in the hospital and providing maternal support both help with this transition (Kramer & Ramsburg, 2002). Friends, too, can serve as buffers in this potentially stressful transition. Kramer and Gottman (1992) found that preschoolers who had good friendships showed less upset than children who did not get along well with friends. Moreover, these preschoolers were more accepting and behaved more positively toward their new sibling.

Do siblings themselves notice that parents treat them differently? Yes, they do. In addition, as we saw in Chapter 2, differential reactions by siblings to parental treatment form the nonshared environmental experiences that help us understand how siblings grow up to be quite different from each other. And such differential parental treatment can, for a disfavored sibling, have adverse effects such as heightened sibling rivalry and increased stress (Dunn, 2007). At the same time, children's own interpretation of differential treatment by parents may defuse such effects. As Kowal and Kramer (1997) found in their study of 11- to 13-year-old siblings, only 25% of adolescents viewed parental treatment as unfair or capricious. The majority accepted it and understood that age, needs, and personal attributes of their siblings accounted for their parents'

behavior. Only when siblings didn't understand or tolerate parental differential treatment did they view their relationships with their siblings negatively.

Older siblings in large families are often assigned the supervisory and disciplinary roles that parents play in smaller families. According to Edwards and Whiting (1993), girls are more likely to fulfill such roles; a firstborn 12-year-old girl in a large family may warm bottles, change diapers, and soothe a squalling infant with the alacrity and skill of a young mother. In African American and Latino American families, older siblings, especially females, often serve as caregivers (Harwood et al., 2002; Zukow-Goldring, 2002). In other cultures, such as Polynesia, sibling caregivers are common (Wiesner, 1993), and in still others—for example, Mexico—siblings rather than parents are the major play partners (Zukow-Goldring, 2002).

Birth order also affects a child's interactions with his siblings. The eldest child is often expected to assume some responsibility for the younger sibling who has displaced him. Older siblings may function as tutors, managers, or supervisors of their younger siblings' behavior during social interactions and may also act as gatekeepers who extend or limit siblings' opportunities to interact with other children outside the family (Edwards & Whiting, 1993; Parke & Buriel, 2006). Parents are likely to restrain or punish the eldest child for showing signs of jealousy or hostility toward a younger sibling, and they often protect and defend the younger child. On the other hand, the eldest child is dominant and more competent and can either bully or help and teach younger offspring. So it's not surprising that older children tend to show both more antagonistic behavior, such as hitting, kicking, and biting, and more nurturant, prosocial behavior toward their younger siblings than the younger ones show toward them (Dunn, 2007; Teti, 2002).

Eldest children focus on parents as their main sources of social learning, whereas younger children use both parents and older siblings as models and teachers (Dunn, 2007). Younger siblings, even infants as young as a year old, tend to watch, follow, and imitate their older siblings (Pepler, Corter, & Abramovitch, 1982). Nor does their influence stop when children enter school, as 70% of children report getting help with homework from siblings, especially from older sisters (Zukow-Goldring, 2002). Older siblings can sometimes serve as deviant or negative influences, encouraging early sexual activity, drug use, or delinquency in their brothers or sisters (East, 1996; Garcia et al., 2000) (see also Chapter 15). Sibling relationships change with age. In adolescence, early overt sibling rivalry and ambivalence may diminish, and intimacy may arise in which a sibling serves as the most trusted confidant and source of emotional support. In concerns about appearance, peer relations, social problems, and sexuality, siblings can often communicate more openly with each other than with peers or parents (Dunn, 2007). Female siblings often become closer over the life span.

When older children are secure in their parents' affection, they often make good teachers and guides for their younger siblings.

The Family Unit as an Agent of Children's Socialization: Family Stories and Rituals

Although we need to focus on marital, parent-child, coparenting, and sibling influences on children's socialization, we mustn't fail to recognize the important role that the family

unit itself plays as an agent of socialization (Parke, 1988). As systems theory emphasizes, the properties, functions, and effects of the family unit cannot necessarily be inferred by analyzing only the parent-child, marital, and sibling subsystems (Minuchin, 2002). Families as units change across development and develop distinct *climates, styles* of responding to events, and *boundaries,* all of which provide differing socialization contexts for the developing child (Kerig, 2008; McHale, 2008). Families develop stories and rituals—activities in which all family members share—and these help transmit family values and roles, reinforcing the uniqueness of the family as a unit.

Generally, parents and other members of the family recount *family stories* in naturalistic contexts and in the presence of their children. Family members may transmit family-of-origin experiences across generations by telling stories and sharing memories, in this way shaping contemporary interaction among family members. Parents can teach children about the importance of their grandparents and other members of their extended family through stories. Read the story this mother told to her 4-year-old child.

> When I was a little girl I lived with my grandfather and grandmother. Grandpa had a big, comfy chair, and I would crawl up on his lap, and he would tell me stories. And one of my favorite things was to comb Grandpa's hair. One day I decided to comb his hair, but he didn't know that I had some little ponytail holders and some pins, and I put little curls all on the top of his head, and he fell asleep. And when he woke up he had the prettiest curls you ever saw all over his head, and he didn't even mind. Wasn't that nice? (Fiese & Bickham, 2004, p. 268)

The child learns through this story about the acceptance and playfulness of grandparents.

Fiese (1990) found that mothers who told stories of their own childhood that emphasized themes of closeness, nurturance, and play engaged in more turn taking and reciprocal interactions with their children. On the other hand, mothers who told stories of either achievement or rejection were less engaged and, when they interacted with their children, more intrusive and directive.

People have known for decades of the importance of *family rituals* in family life, but it's only recently that researchers have recognized the socialization function of these rituals (Fiese, 2006). Family rituals range from formal and intricate religious observances, such as a first communion or a bat or bar mitzvah, to less articulated daily interaction patterns like the kind of greeting family members give to someone returning home. Rituals serve an important protective function (Cicchetti & Toth, 2006). Researchers have found, for example, that children who came from families who were able to preserve family rituals such as dinner and holiday routines were less likely to become alcoholic as adults and that adolescents from families who attach more meaning to their rituals tend to have higher self-esteem than other children (Fiese, 2006; Pratt & Fiese, 2004). Rituals offer a powerful clue to the nature and quality of family functioning and have clear protective advantages for the child.

In sum, stories and rituals show us that families function not just as collections of individuals but also as true systems. Moreover, families differ from one another in special ways, much the way individuals differ from each other. In a sense, just as each individual develops a unique personality, so families develop ways of interacting that give them a unique signature or identity.

SOCIAL CLASS, ETHNICITY, AND SOCIALIZATION

No culture is entirely homogeneous. Subgroups within a culture may have different values, attitudes, and beliefs as well as different problems to cope with. Any or all of

1 in 2	Lives with a single parent at some point during childhood
1 in 3	Is born to unmarried parents
1 in 5	Is born poor
1 in 5	Is born to a mother who does not graduate from high school
1 in 5	Has a foreign-born mother
1 in 6	Is born to a mother who received no prenatal care during the first 3 months of her pregnancy
1 in 7	Has no health insurance
1 in 7	Lives in a family that is poor even though one adult works
1 in 8	Is born to a teenage mother
1 in 8	Lives in a family that receives food stamps
1 in 15	Is born into a family living at less than half the poverty level
1 in 24	Lives with neither parent
1 in 60	Sees his parents divorce in any year

Table 11-2

Some facts about U.S. children and their families: 2002

Source: Adapted from Children's Defense Fund, 2004.

these differences may be reflected in unique goals of socialization and methods for achieving it.

Poverty and Powerlessness

Both scholarly and lay writers have focused much attention, in recent years, on the differences between the life situations of families of the lower and middle social classes in American culture. Of particular importance is the prevalence of children living in poverty and under extremely unfavorable circumstances (see Table 11-2). Since the early 1970s, the number of U.S. children under 18 living in poverty has risen by more than 60%. In 2005, over 12 million children (nearly 17% of America's children) were living in poverty, but the rates vary by ethnicity of the family (see Figure 11-6) (U.S. Census Bureau, 2006). Moreover, an American child is more likely to be poor than a child in Canada or Europe. A child in the United States is five to eight times more

Children under 18 living in poverty (percent)
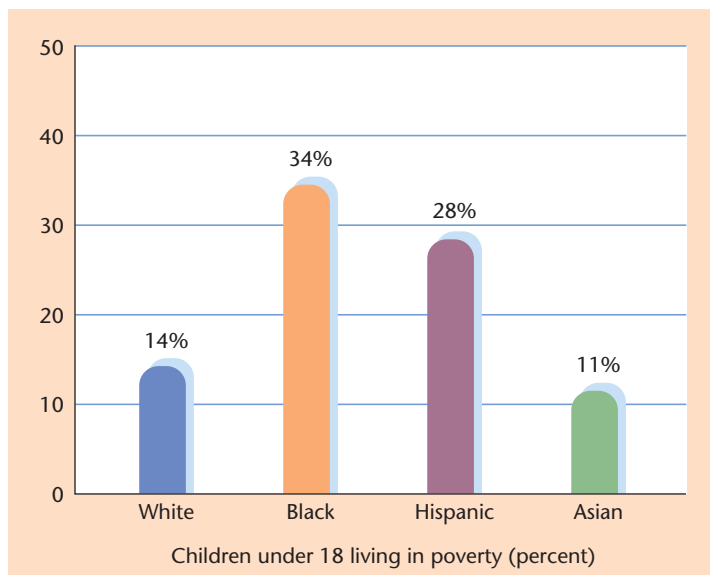
Figure 11-6

Children living below the poverty line by race and Hispanic origin, 2005

Whereas the percentages of white and Asian American children living below the poverty line are below the average figure for all U.S. children (approximately 16%), the percentages of African American and Hispanic American children far exceed the average.

Source: Based on U.S. Census Bureau, 2006.

likely to be poor than a child in Sweden, Norway, or Finland (Child Trends, 2006; U.S. Census Bureau, 2006). Although the most obvious differences between the lower and middle classes are seen in the indicators of socioeconomic status—income, education, and occupation—other related and pervasive features of the lives of the lower and middle classes may be more directly relevant to the socialization process (e.g., dangerous neighborhoods, chronic stress).

ECONOMIC HARDSHIP   Powerlessness is a basic problem of the poor. The poor have less influence over the society in which they live and are less likely than members of the middle class to be treated adequately by social organizations and with appropriate concern. The poor receive fewer health and public services, and their lack of power, information, and educational and economic resources restricts the options available to them. The poor have little choice of occupation or housing and little contact with other social groups; they are vulnerable to job loss, financial stress, and illness and subject to impersonal bureaucratic decisions in the legal system and in social institutions such as welfare agencies. Agents of the law, social workers, educators, and others are more likely to violate their individual rights than those of middle-class people.

According to McLoyd and her colleagues (McLoyd et al., 2001; McLoyd et al., 2006), in view of the multiple stresses, few resources, and little social power possessed by poor parents, it is not surprising that many experience considerable psychological distress, feel helpless, insecure, and controlled by external forces, and are unable to support and nurture their children adequately (Figure 11-7). Nor is it only poor families who suffer in this way. As Conger and Elder (1994) have shown, families at a variety of income levels who suffer economic stress of any kind are more likely than nonstressed families to experience depression and marital conflict and to be harsh with their children. Moreover, the effects of economic stress on family functions have been documented in families of many ethnic derivations, such as European American, African American, and Mexican American families. White families in the midwestern United States who lost their family farms in the recession of the late 1980s, poor African American families in rural Georgia, and economically stressed Latino families in California in the mid-1990s all showed similar responses to economic hardship (Brody et al., 2002; Conger & Dogan, 2007; Parke et al., 2004). Similar effects of economic hardship have been found in other countries such as Romania, Australia, Great Britain, and Brazil as well (Robila
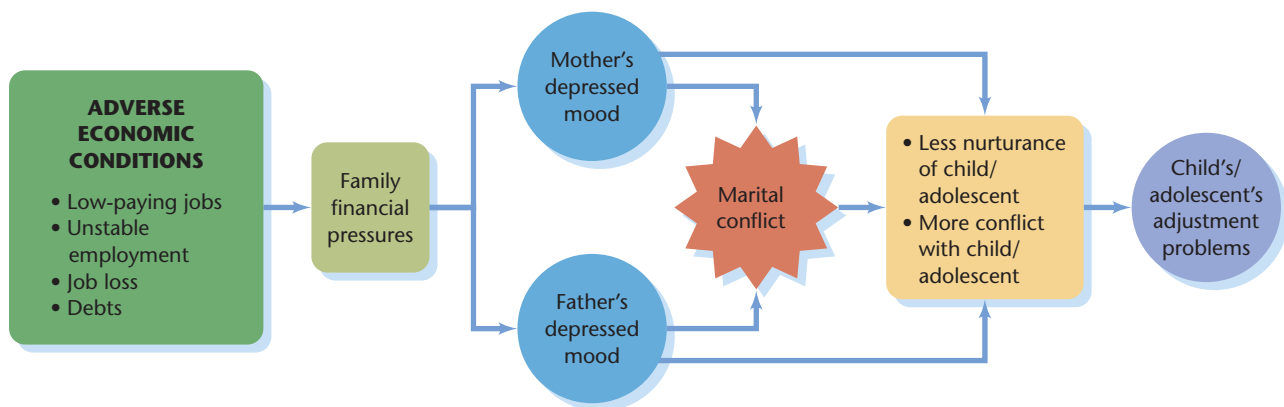
Figure 11-7

How economic stress can lead to children's adjustment problems

Adverse economic conditions may combine with personal financial stressors to create worry and insecurity in parents, which can lead to family conflict that may interfere with children's and adolescents' healthy adjustment.

Source: Adapted from Conger, Conger, Elder, Lorenz, Simons, & Whitbeck, 1992.

& Krishnakumar, 2005). Clearly, economic hardship affects families regardless of race, ethnicity, or nationality.

The mutual assistance and support among the poor themselves often relieve this dismal picture. Perhaps the very stresses that highlight their powerlessness lead working-class families to form extensive support networks of kin, friends, and neighbors; such networks are particularly common among economically deprived black families (Brody et al., 1996; Gadsden, 1999) and Latino families (Coltrane et al., 2007). These systems provide families not only with emotional support but also with unpaid services that could not otherwise be purchased. Families and friends render each other mutual assistance in meeting emergency needs in times of unemployment, childbirth, illness, and death, as well as the day-to-day needs of family life (Coltrane et al., 2007).

IMPACT OF POVERTY ON CHILDREN How does poverty affect children's development? First, poor children face more risks to physical health than do children of affluent families: Poor children are 1.9 times more likely to have low birthweight, 2.8 times more likely to have inadequate prenatal care, 3.5 times more likely to suffer lead poisoning, 1.7 times more likely to die during childhood, 2.0 times more likely to endure a short-term hospital stay, and 8 times more likely to have had too little food some time in the last 4 months. In short, being poor is bad for a child's health (Children's Defense Fund, 2007; Duncan & Brooks-Gunn, 2000). Nor is poverty helpful for children's achievement. Children in poverty are twice as likely to be retained in a grade and 3.5 times as likely to drop out of high school (Children's Defense Fund, 2007). Poor children are 1.3 times more likely to suffer emotional or behavior problems, 6.8 times more likely to suffer child abuse or neglect, and over 2.2 times more likely to encounter violent crime.

Timing of poverty matters. Being poor in early childhood is much more detrimental than being poor in middle childhood or adolescence (McLoyd et al., 2006). A $10,000 increment to income over the first 5 years of life for children in low-income families is associated with nearly a threefold increase in the chances of finishing high school. Increasing income later in childhood has been seen as less effective in producing a change (Duncan et al., 1998). Poverty affects children through several pathways. First, the quality of the home environment differs in poor and nonpoor families (Bradley et al., 2001). Children in poor homes have fewer physical resources (books, toys, educational games, computers); they also receive fewer learning opportunities and less cognitive stimulation (parents less often read to children or engage in other developmentally appropriate activities) than children in nonpoor homes. Second, the quality of care young children receive outside the home also matters, and poor children are often placed in poorer quality child-care settings. Third, poverty and economic stress are linked with parent-child conflict; this leads to lower grades and impairs emotional and social development. A fourth effect of poverty is that poor families often live in high-risk neighborhoods characterized by social disorganization (crime, unemployment, low parental supervision) and limited resources (fewer playgrounds, after-school programs, child-care and health-care facilities); such poor neighborhoods can adversely affect children's development (Leventhal & Brooks-Gunn, 2000). Finally, poor parents often suffer more physical and emotional problems that impair their parenting abilities. Children suffer as a result of this reduced parental competence.

We have painted a bleak picture of the impact of poverty on children, but there is some good news: The effects of poverty are reversible. Recent evidence based on experimental studies in which families received supplemental income suggests that an increase in family income is linked with improvement in poor children's school engagement and social behavior (Morris & Gennetian, 2003). How do recent changes in welfare policies affect children's development? As a result of legislation in the 1990s, welfare reform efforts have been directed at reducing family dependence on welfare and at increasing families' participation in the work force. Researchers have found that when reforms increased work opportunities and provided the kinds of financial sup-

port that led to a net gain in income for working families, children achieved higher levels of school performance and showed more positive social behavior. In contrast, welfare reforms that mandated work but did not result in an overall financial gain had few effects on children (Morris et al., 2001). However, when decreased dependence on welfare is linked with increased income, children were found to exhibit fewer problem behaviors and to perform better in school, and mothers were less depressed and reported less domestic violence (Gennetian & Miller, 2002).

Cultural Patterns in Child-Rearing

In general, social-class differences in family relations are more marked than variations based on race or ethnicity (Parke & Buriel, 2006). However, because race and social class do tend to be related, separating these factors has often been difficult; minorities are overrepresented in poorer and less educated families. Keep in mind, though, that over 10% of white children in the United States also live in poverty (see Figure 11-6). Unfortunately, investigators have often treated ethnic groups as if they were homogeneous; rarely have they recognized the great variability within such groups. For example, in the United States, there are many distinct Hispanic groups: Mexican, Puerto Rican, Cuban, Spanish, Colombian, Chilean, and Dominican, to name only a few. Spanish-speaking people of these and other groups have quite different socioeconomic, cultural, and linguistic characteristics; moreover, within each group, there are subgroups that have great individual variation (Parke & Buriel, 2006).

Parents' and children's behavior must always be understood in the context of the meanings and values of the individual's particular sociocultural niche (McLoyd et al., 2006; Parke & Buriel, 2006; Rothbaum & Trommsdorf, 2007). For example, in socializing their children, many ethnic minorities are more likely than the European American majority to place emphasis on continuity of ethnic values and worldviews and on social interdependence. In many groups, we see reflections of such interdependence in the important role played by the **extended family**—the family inclusive of grandparents, aunts, uncles, nieces, and nephews (McLoyd et al., 2005). This emphasis

extended family A family that includes relatives such as grandparents, aunts, uncles, nieces, and nephews within the basic family unit of parents and children.

Both the nuclear and the extended family are important in most Hispanic cultures, which emphasize sharing and cooperation in both good times and bad.

on interdependence is also reflected in a concern with cooperation, obligation, sharing, and reciprocity, which contrasts with North American ideals of self-reliance and competition. On the other hand, Chinese American parents and parents in other Asian American subcultures, who also emphasize family cooperation and obligation, encourage self-sufficiency and achievement even more than do European American parents (Chao & Tseng, 2002). Once again, we must always know what group we're talking about when we make general statements.

Different parenting styles are found among many U.S. subcultural groups, but the effects of these styles seem to vary among some groups. Studying more than 20,000 high school students from varying ethnic and class backgrounds, Steinberg and colleagues (1992) found that in European American, African American, and Asian American families, authoritative parenting had similar benefits in promoting better psychosocial adjustment and in minimizing depression and delinquency in adolescents. However, these researchers found that the relations specifically between authoritative parenting and school performance were less consistent for African American and Asian American adolescents than for European American and Latino American adolescents (Steinberg et al., 1995). European and Latino American adolescents were more likely to benefit academically from authoritative parenting than were African American or Asian American adolescents. Within African American and Asian American groups, adolescents with authoritative parents did not show greater academic achievement than those with nonauthoritative parents. How can these findings be explained?

Research has often shown that African American and Latino American students earn lower grades, drop out more often, and attain less education than non-Hispanic white students, whereas the academic performance of Asian American students exceeds that of the other three groups (Chao & Tseng, 2002; Fuligni, 1997). Moreover, even when such factors as socioeconomic status and family structure are controlled for, these ethnic differences in achievement appear. In their study, Steinberg and his colleagues concluded that differences in achievement in students of different ethnic backgrounds may well reflect the nature of the peer groups with whom students associate. Mapping the social structure of these groups across the students' schools, these investigators found that students from one ethnic group rarely knew or associated with students from other ethnic groups. Even more interesting was their finding that across all ethnic groups, children performed best when both their parents and their peer groups supported achievement. They did less well, however, with support from only one of these sources and least well when neither their parents nor their peers supported achievement.

European American and Asian American adolescents were more likely to belong to peer groups that encouraged engagement in school activities and academic achievement. In Steinberg's study, both Latino American and Asian American parents tended to be authoritarian, a parenting style that has been associated with low achievement. The researchers postulated that it was the Asian American students' access to supportive peer groups that enabled them to perform better. Recall our discussion of this issue in Box 11-2, however, which suggests that this parenting style, at least among Chinese parents, may encourage achievement (Chao, 1994, 2001) and, moreover, that same-culture peer groups are likely to reflect same-parental training.

THE CHANGING AMERICAN FAMILY

The American family has been changing for some years now, and although some have predicted the demise of the family, it seems more accurate to say that family forms and family members' roles are becoming more varied. Most children still live in families with two parents who have been married only to each other. However, the proportion of **traditional nuclear families**—composed of two parents and children, with the father as the sole breadwinner and the mother as the homemaker is declining. What are some of the main changes in family structure and functioning that are occurring?

traditional nuclear family The traditional family form, composed of two parents and one or more children, in which the father is the breadwinner and the mother the homemaker.

Figure 11-8

Living arrangements of children by race and ethnic origin

Like children living in poverty (see Figure 11-6), children living with a single parent are more likely to be African American or Hispanic American. European or Asian American children are more likely to live in two-parent families.

Source: Based on Child Trends, 2007, and the U.S. Census Bureau, 2006.

Living Arrangements of Children, by Race and Hispanic Origin, 2006

■ White ■ Black ■ Hispanic ■ Asian

Living with two married parents: White 74, Black 35, Hispanic 66, Asian 84
Mother only: White 18, Black 51, Hispanic 25, Asian 10
Father only: White 5, Black 5, Hispanic 4, Asian 4
Living with no Parent: White 4, Black 9, Hispanic 5, Asian 3
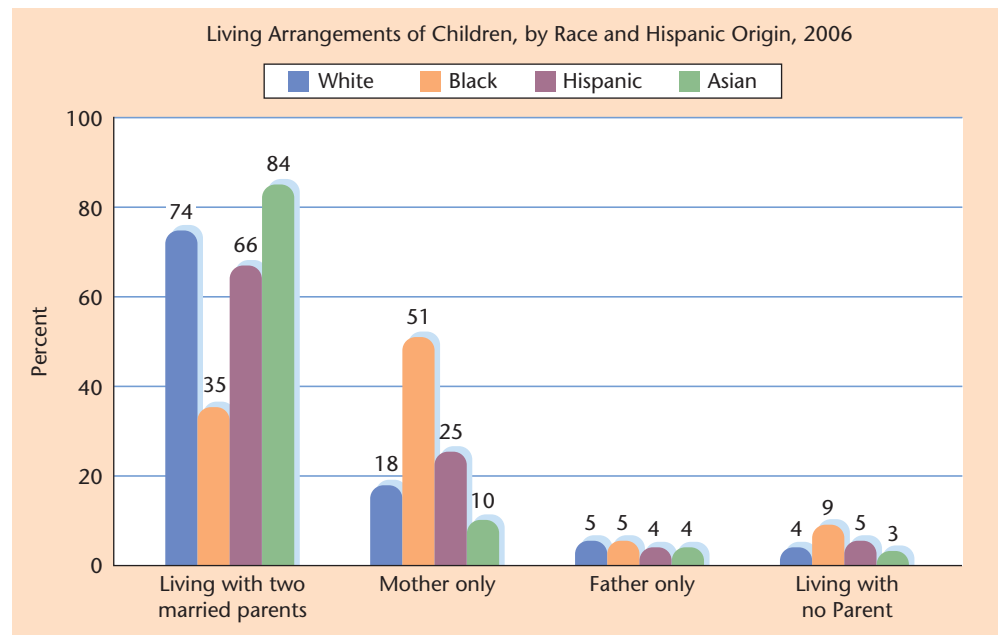
The average household size has decreased to 2.6 people. The average number of children in a U.S. family is 1.8, and it is even lower in some other countries. In Japan and the Netherlands, for example, the rate is 1.5, and in Germany, it is 1.3 children per family (Bellamy, 2000). There are a greater number of single-adult households. This is attributable, in part, to delays in marriage, declines in birth rates and in remarriages, and an increase in the number of elderly people living alone.

There are more single-parent households today, primarily because of the rising divorce rate but secondarily because more unmarried women are having children. The divorce rate doubled between 1960 and 1985; it is estimated that 40% to 50% of marriages today will end in divorce and that 60% of these divorces will involve children. In 2006, nearly 28% of children under 18 lived with a single parent, but this figure was much higher for some ethnic groups (Figure 11-8). It was also much higher for U.S. families than for those in other industrialized countries (Figure 11-9). One third of children will experience the remarriage of one or both of their parents, and 62% of remarriages end in divorce. Thus, more parents and children are undergoing multiple marital transitions and rearrangements in family relationships.

Over the past 40 years or so, out-of-wedlock births have doubled. Whereas in 1960 there were 22 births per 1,000 unmarried females, in 2004, 46 births per 1,000 unmar-

Figure 11-9

Single-parent families in some industrialized countries

The United States has by far the greatest percentage of single-parent families with underage children of all the countries represented; the U.S. rate is almost four times the percentage of such families in Japan.

Source: Santrock, 2005.

Single-parent families with children under 18 in different countries (percent)

US 23, Sweden 17, Canada 15, Germany 14, UK 13, Australia 11, France 11, Japan 6
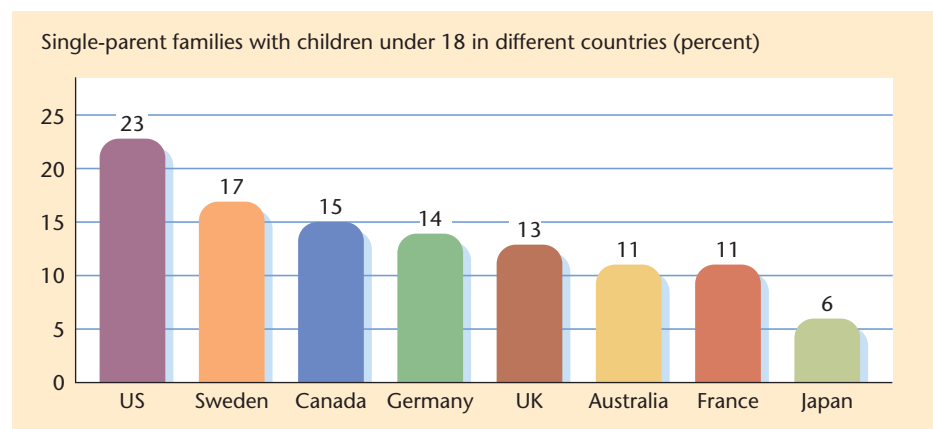
ried females were recorded (Child Trends, 2007). Seventy percent of African American women have borne babies out of wedlock; among Native Americans the percentage was 57, among Latino Americans 43, among European Americans 25, and among Asians and Pacific Islanders 16 (Children's Defense Fund, 2007). Contrary to popular wisdom, more than twice as many unmarried mothers are women over 20 years old, not under 20. We examine teenage parenthood later in the chapter.

The number of working mothers has increased. In 2006, 68% of mothers with children under the age of 18 were in the labor force (Children's Defense Fund, 2007). Young mothers, poor mothers, and mothers from single-parent families are most likely to enter the labor force because of economic need. Two thirds of mothers in single-parent families work outside the home, and another fifth are seeking employment. Eighty-six percent of black mother-headed households and 38% of white mother-headed households fall below the poverty line, in contrast to 46% and 16%, respectively, of two-parent households.

We look first, in this section, at changes in the family that are associated with maternal employment and then at the kinds of changes that unwed single parenting, divorce, and remarriage bring about. As we will see, although many children of divorce continue to live with their mothers, joint custody arrangements have become somewhat more common.

Parental Employment and Child Development

Since the 1970s, increasing numbers of mothers, particularly of preschool children, have been entering the labor market. As mothers spend more time on the job and less in the home, family roles and patterns of functioning are changing. What are some of the changes that have already occurred, and how do they influence children's behavior? How does work-related stress influence children?

One shift may be a growing similarity between the roles of the mother and father. When children more often see both of their parents as providing for the family and as participating actively in family and child-rearing tasks, the stereotypical roles of the breadwinning father and the homemaking mother may begin to fade away (Pleck & Masciadrelli, 2004). Note, however, that although father participation increases in dual-career families, currently mothers are still doing most of the child care and housework (Coltrane, 2000).

Working mothers report that time is their scarcest and most valued resource. Both working mothers and their school-age children complain that the mothers have too little time to spend with their children (Booth et al., 2002; Perry-Jenkins et al., 2000). However, greater father involvement may compensate for some of these problems. In both dual-earner and single-earner families, high father involvement is associated with higher IQ and achievement test scores, as well as with greater social maturity in children (Gottfried et al., 2002).

Children of working mothers have more egalitarian views of gender roles (Hoffman, 2000; Hoffman & Youngblade, 1999), and children in middle-class families whose mothers are employed have higher educational and occupational goals. Daughters are less likely to display traditional feminine interests and characteristics and more often perceive the woman's role as involving freedom of choice, satisfaction, and competence; daughters themselves are career- and achievement-oriented, independent and assertive, and high in self-esteem (Hoffman, 2000). The sons of working mothers, in contrast to sons of full-time homemaker mothers, not only perceive women as more competent but view men as warmer and more expressive.

What are the long-term effects of maternal employment? Gottfried and colleagues (2002) found no relationship between maternal employment and children's development from infancy to the age of 12 and concluded that no sleeper effects were associated with mothers working outside the home. The children of both mothers who were full-time

homemakers and mothers who worked outside the home were similar in cognitive, socioemotional, academic, motivational, and behavioral domains from infancy through adolescence. Research has shown that such factors as parental involvement and the quality of the home environment were clearly linked to children's development, regardless of mothers' occupations (Bradley et al., 2001; Parke & Buriel, 2006).

It appears that individual differences among mothers are more significant for children's development than a mother's status as an employee outside the home or as a homemaker. Mothers who derive a sense of satisfaction and self-efficacy from their homemaking role and working mothers who enjoy their employment both show more positive relations with their husbands and with their children than unhappy homemakers who would like to be employed (Hoffman, 2000). However, mothers and fathers both display more negative feelings and behavior toward their children when their attitudes toward maternal employment and the wife's work status are not congruent (Hoffman, 2000).

Despite many predictions to the contrary, studies have indicated that with adequate alternative child care, maternal employment does not usually have detrimental effects on children. It is important, however, in evaluating the effects of maternal employment, that we consider all relevant factors, such as the mother's reasons for working, her level of job satisfaction, the demands her employment may place on other family members, the attitudes of these family members toward her employment, and the quality of the substitute care and supervision provided for the children.

WORK STRESS AND CHILDREN'S ADJUSTMENT   What determines how parental employment affects a child's development? It is not just whether one parent or the other works; the nature of the work situation determines the effects of parental employment on a child's development. As we have seen, maternal employment per se does not put children at risk. However, a parent's experience of stress on the job may take its toll on children, parents, and marriages (Crouter & Bumpus, 2001). Fathers who worked in a high-stress occupation, air traffic control, withdrew from their wives and were more irritable with their children after a stressful day (Repetti, 1989, 1996). Similarly, mothers were more likely to withdraw from their children after particularly stressful workdays (Repetti & Wood, 1997). Finally, children of mothers who work nonstandard schedules (evening, night, or rotating shifts) have poor early cognitive and language development (Han, 2005). In sum, it is not merely working or not working that matters but the conditions under which adults work that make a difference in children's lives.

SELF-CARE: THE CASE OF LATCHKEY CHILDREN   The need for child care that we discussed earlier (Chapter 6) does not stop when children enter school, and it is a cause of concern for working parents. More than 2 million children care for themselves part of the day without the benefit of parental supervision: Approximately 20% of 6- to 12-year-olds are **latchkey children**, who must let themselves into their homes because one or both parents are at work elsewhere (Urban Institute, 2000). Not surprisingly, self-care increases with age, and by adolescence, many children are in self-care at least some of the time. What are the effects of unsupervised care? On the positive side, self-care places greater demands on children for responsibility and maturity (Belle, 1999). And some children appreciate the positive aspects of being left on their own.

As one child noted, the best things about her unsupervised arrangement are "being able to come home. Being able to have unstructured time. Being able to relax after school. Having flexibility. Being able to decide last minute to play with another friend . . ." (Belle, 1999, p. 87). But there is a downside for children to being left on their own. Children who are left unsupervised are at higher risk for a variety of problems such as increased delinquency and antisocial behavior, poorer grades, heightened stress, and greater substance abuse (Belle, 1999). And the risks of leaving children unsupervised

latchkey children Children who must let themselves into their homes after school because a parent or both parents are working outside the home.

One reason some schoolchildren come home to empty houses—estimates of the numbers of latchkey children have run as high as 10 million—is the lack of sufficient child-care and after-school programs.

are not lost on parents. As one mother fretted: "It puts more pressure on me worrying about what she's doing in the afternoon. From 3 P.M. on I can't be totally relaxed. I'm thinking about whether she's home doing homework" (Belle, 1999, p. 87).

What helps reduce the risks associated with self-care? *Distal monitoring* in which parents check in by phone can be useful, as can devising clear rules and expectations about permitted activities, friends, and places (Belle, 1999). Perhaps the most helpful alternative is after-school care programs. Children who are enrolled in high-quality after-school programs during the elementary school years benefit in many ways. They have better grades, avoid drugs and delinquency, and have better relationships with their peers (NICHD Early Child Care Research Network, 2004a; Vandell et al., 2005). And parents feel better, too: "Justin's after-school program relieves me of the fear of him being caught on the streets unattended. He's playing with a selected group of kids. He's not . . . [strapped] to the T.V. I feel so comfortable with the program and teachers" (Belle, 1999, p. 88).

Just as we saw in the case of child care for younger children, quality is the key. Poorly supervised and disorganized after-school programs can be detrimental to children's development (Vandell et al., 2005). In short, parents need to be careful to choose quality after-school care.

Marital Transitions

We need to view divorce and remarriage not as discrete events but as steps in a transition that will modify the lives and development of parents and children. Children's experiences in earlier family situations will modify their response to this transition. The response of family members to divorce and to life in a single-parent family is generally a function of the quality of family life that preceded the separation and divorce. In like fashion, the response to remarriage will be shaped by experiences in the earlier marriage and the subsequent single-parent household. Both divorce and remarriage force a restructuring of the household and changes in family roles and relationships (Clarke-Stewart & Brentano, 2006; Hetherington & Kelly, 2002).

Although divorce is sometimes a positive solution to destructive family functioning, for many family members the transition period following separation and divorce is highly stressful. During the first year after a divorce, parents' feelings of distress and unhappiness, troubled parent-child relationships, and children's social and emotional

adjustment actually get worse (Hetherington, 2006). In the second year, however, when families are adapting to their new single-head-of-household status, many parents experience a dramatic improvement in their sense of personal well-being, interpersonal functioning, and family relations. In the long run, children in stable, well-functioning single-parent households are better adjusted than children in conflict-ridden nuclear families.

Some researchers have suggested that when parents delay divorcing—sometimes in the hope of protecting their children—those children show behavior problems long before the divorce finally takes place. Moreover, these problems may be greater than those of children whose parents have some difficulties but remain in their marriage (Clarke-Stewart et al., 2000). It is possible that children respond adversely to the acrimony and conflict in a stressed marriage, particularly when it is suppressed, or behavior problems in children may exacerbate difficulties in a troubled marriage and help to precipitate a divorce.

DIVORCE AND THE SINGLE-PARENT HOUSEHOLD   What are the most important effects of divorce on children? When divorce leads, as it usually does, to children living in a single-parent household, how does the family's lifestyle and functioning differ? What kinds of stresses are single-parent households more likely than nuclear families to encounter? Can a single parent cope with all that two parents have handled up to now? Does the single parent have time to be a parent?

When divorced parents and their children do not experience additional stresses following divorce, most are coping reasonably well by the second or third year after a divorce. However, one-parent mother-headed households are at increased risk of encountering multiple stresses that make it difficult to raise children successfully, and in fact, a period of diminished parenting often follows divorce (Hetherington & Stanley-Hagan, 2002). Custodial mothers may become self-involved, erratic, uncommunicative, nonsupportive, and inconsistently punitive in dealing with their children. They may also fail to control and monitor their children's behavior adequately. Not uncommonly, chil-

dren reciprocate in the immediate aftermath of divorce by being demanding, noncompliant, and aggressive or by whining and being overly dependent. Not a very winning combination! Divorced mothers and sons are particularly likely to engage in escalating, mutually coercive exchanges. Some desperate divorced mothers have described their relationships with their children right after a divorce as "declared war," a "struggle for survival," "the old Chinese water torture," or "like getting bitten to death by ducks." Although inept parenting is most marked in the first year following divorce—parenting improves markedly in the second year—problematic parenting is more likely to be sustained with sons, especially temperamentally difficult sons, than with daughters. Divorced mothers and their daughters are likely eventually to form exceptionally close relationships, although mothers may have to weather their daughters' acting-out behavior in adolescence (Hetherington & Kelly, 2002). Despite the foregoing, Wolchick and colleagues (2000) found that when divorced mothers are high in warmth and consistent in their discipline, 8- to 15-year-olds had fewer adjustment problems than their peers in less warm and consistent families.

Noncustodial as well as custodial parents can continue to play a significant role in their children's development. When divorced parents agree on child-rearing methods and maintain a reasonably friendly attitude toward each other, frequent visits between the children and the noncustodial parent may be associated with positive adjustment and self-control in the children. When the mother has custody, such visits are particularly helpful for sons. When there is continued conflict between parents, however, especially conflict where the child feels caught in the middle or when the parent is a nonauthoritative parent or is poorly adjusted, frequent contact between the noncustodial parent and the child may be associated with disruptions in the child's behavior (Buchanan & Heiges, 2001; Buchanan et al., 1991). Clearly, what counts is the quality of the contact with a noncustodial parent and the exposure of the child to conflict and stress.

FAMILY INTERACTION IN REMARRIED FAMILIES   Family members' experience in their original family setting greatly affects their response to remarriage. For divorced women, remarriage is the most common route out of poverty, and a new partner may give a custodial mother not only economic but emotional support as well as help in child-rearing.

Children sometimes resist the arrival of a stepparent, creating stress in the new marital relationship. Sons, who have often been involved in coercive relationships with their custodial mothers, may have little to lose and much to gain from a relationship with a caring stepfather. Daughters, on the other hand, may feel the intrusion of stepfathers into their close relationships with their mothers as more threatening and disruptive. Among preadolescent children, divorce seems to have more adverse consequences for boys, and remarriage seems to be more difficult for girls. Adolescents, regardless of gender, have a particularly difficult time accepting a parent's remarriage (Hetherington & Stanley-Hagen, 2002).

In general, neither stepmothers nor stepfathers take as active a role in parenting as biological parents (Clarke-Stewart & Brentano, 2006). Indeed, many stepfathers are rather like polite strangers with their stepchildren, hesitating to become involved in controlling or disciplining them. Stepmothers, who walk into the maternal role, are forced to take a more active role in discipline than are stepfathers (Cherlin & Furstenberg, 1994). This may in part explain the finding that children are more resistant and have poorer adjustment in stepmother families (Cherlin & Furstenberg, 1994; Hetherington et al., 1998). In addition, a child's age at the time of a parent's remarriage will affect both the child's attitude toward the new marriage and the likelihood that she will develop any kind of problem behavior. Although we have been focusing on the effects of divorce and remarriage on parent-child relations, sibling relations also are often disrupted. More antagonistic, nonsupportive relations are found among siblings in divorced and remarried families than among those in nondivorced families (Conger & Conger, 1996; Dunn & Davies, 2000; Hetherington et al., 1998). These adverse effects

are most marked for male siblings, whereas some pairs of female siblings serve as mutual supports in coping with their parents' marital transitions.

CHILDREN IN DIVORCED AND REMARRIED FAMILIES   Over time, most boys and girls adjust reasonably well to their parents' marital transitions. Exhibiting remarkable resilience, some children actually become stronger through coping with divorce and remarriage. In fact, only about 25% have long-term problems (Hetherington & Kelly, 2002). Authoritative parenting is associated with more positive adjustment in children in divorced and remarried families, just as it is in nondivorced families. If divorce reduces stress and conflict and leads to better functioning on the part of the custodial parent, or if the child's loss of an uninvolved or incompetent father eventually results in the acquisition of a more accessible, responsive father figure, the child often benefits in the long run from divorce and remarriage. Preadolescent boys in particular may benefit from a close, caring relationship with a stepfather.

The most commonly reported problem behaviors found in children of divorced and remarried families are aggressive, noncompliant, antisocial behavior; a decline in prosocial behaviors; and disruptions in peer relations (Clarke-Stewart & Brentano, 2006; Hetherington et al., 1998). Adolescence seems to trigger adjustment problems (depression, substance abuse, precocious sexuality) in both boys and girls in divorced and remarried families (Hetherington & Kelly, 2002). Problems in academic achievement, school adjustment, and school dropout are greater for boys than for girls in divorced families.

What are the long-term effects of divorce and remarriage on a family's children? National survey studies suggest that divorce is related to several negative outcomes (Amato, 2000, 2001; McLanahan & Sandefur, 1994). The risk of dropping out of high school was nearly twice as high for children of divorced families as it was for children in intact families (Figure 11-10), and failing to finish school may reduce future employment and educational opportunities. Perhaps the most dramatic evidence of the long-term effects of divorce comes from a study of the predictors of longevity (Freidman et al., 1995). In a follow-up investigation of a group of gifted children originally studied by Lewis Terman in the 1920s, individuals who experienced parental divorce during childhood were likely to die sooner than those whose parents stayed married. Although these individuals were more likely themselves to divorce as adults, even after taking this into account, parental divorce was still a predictor of premature death. Achieving a sense of personal satisfaction and not smoking lessened the link between parental divorce and mortality (Martin et al., 2005). Clearly, divorce has long-term consequences, although the mechanisms by which divorce alters longevity are still not well understood.

Figure 11-10

Education and one-parent families

As measured in four separate studies, the risk of dropping out of high school was nearly twice as high for children living in one-parent families (including stepfamilies) as for those living with two parents.

Source: From *Growing Up with a Single Parent* by Sara McLanahan and Gary Sandefur. Cambridge, MA: Harvard University Press, 1994, p. 41.

Note: NLSY = National Longitudinal Survey of Youth; PSID = Panel Study of Income Dynamics; HSB = High School and Beyond Study; NSFH = National Survey of Families and Households.
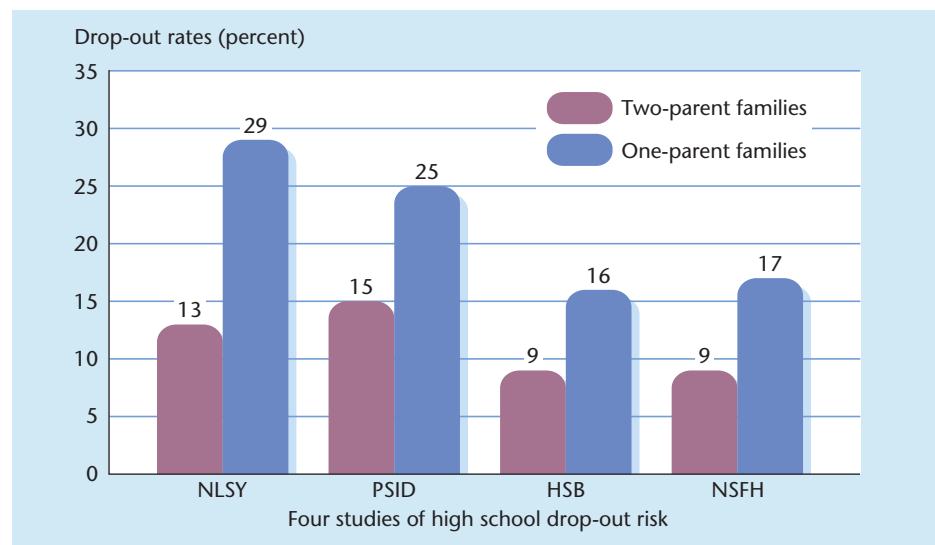
CHILD CUSTODY   Although mothers more commonly gain custody after a divorce, the traditional doctrine of sole custody has been reexamined. Perhaps children and ex-spouses would all benefit if joint custody was always an option in divorce cases involving children: "At its best, joint custody presents the possibility that each family member can 'win' in post-divorce life" (Thompson, 1994, p. 17). Neither mother nor father is identified as a better or worse parent, and mothers and fathers each win a significant future role in the lives of their children. Perhaps even more important, the children win.

Joint custody takes two main forms. In **joint legal custody**, both mother and father retain and share responsibility for decisions concerning their children's lives, but the children usually reside with one parent. Under a **joint physical custody** arrangement, the children live with each parent for certain periods throughout the year. Although the length and timing of these periods vary, it is expected that children will have physical access to both parents on a regular basis.

Joint custody works best when conflict between parents decreases and when children don't "feel caught" in the middle (e.g., as a messenger) between warring parents (Buchanan et al., 1996). Older adolescents and girls were more likely to feel caught in the between-parent squeeze. Adolescents with stronger feelings of "being caught" were more likely to experience depression and anxiety and to engage in more deviant behavior (e.g., smoking, drug use, fighting, cheating, stealing) than adolescents who experienced more interparental cooperation (Buchanan & Heiges, 2001).

The degree of parental conflict, rather than the custody arrangement itself, seems to be the best predictor of children's adjustment (Buchanan & Heiges, 2001; Goodman et al., 1998). Joint custody is clearly not a panacea for divorced families or for divorced fathers in particular. Fathers' influence and contact with their children seem less governed by custody arrangements than by other factors, such as geographic distance and relationship with the ex-spouse. In the long run, the advantage of joint custody may be its "symbolic value to parents and children" (Emery, 1988): It may offer a sign to fathers that they retain some rights and obligations as a parent and a message to their children that their fathers are still significant figures in their lives. At the same time, it is evident that joint custody is not a problem-free solution, especially if interparental conflict continues after divorce (Buchanan & Heiges, 2001). Evaluations are needed of the long-term impact of differing types of custody arrangements on children as well as on their parents.

joint legal custody   A form of child custody in which both parents retain and share responsibility for decisions regarding the child's life, although the child usually resides with one parent.

joint physical custody   As in joint legal custody, parents make decisions together regarding their child's life, but they also share physical custody so that the child lives with each parent for a portion of the year.

LATE-TIMED PARENTHOOD   People are not only marrying later today than in earlier times (3 or 4 years later than they did in the 1950s), but they are also becoming first-time parents at later ages. Between 1991 and 2003, there was a 12% increase in birth rates of women aged 30 to 39 and even higher rates of increase for women over 40 (Martin et al., 2005). Although there may be many reasons for later parenthood, important factors are doubtlessly widespread maternal employment, more flexibility in gender roles for both men and women, and greater availability of support services such as child care. In addition, by the time a couple are in their 30s, they have usually completed their educations and are fairly well established in their careers.

Delaying the decision to become parents sometimes means that a couple will have difficulty in conceiving (Henig, 2004), and in fact, older prospective parents are major consumers of the new reproductive technologies (see Box 2-2, Chapter 2). As Hahn and DePietro (2001) note,

> Research on the effects of reproductive technologies has been fueled by the speculation that the emotional distress associated with previous infertility and the unusual form of transition to parenthood may influence a [formerly] infertile couple's relationship, their quality of parenting and, ultimately, the parent-child relationship. (p. 37)

Are these concerns warranted?

Research to date suggests that children born via the technique of donor insemination, for example, function as well as children born in the usual manner (Golombok, 2006; Patterson & Hastings, 2007). And recent study of the technique of surrogacy suggests not only that the offspring of surrogate mothers develop well but also that these children may benefit from parent-child relationships that are even more positive than many that obtain in naturally conceived families. In part, this may be due to the eagerness of couples who must make extraordinary efforts to become parents (Golombok et al., 2004).

For both mothers and fathers, age of onset of parenting is linked with both parenting practices and knowledge. Between the teen years and 30, increasing age of first-time motherhood is related to greater satisfaction and higher parenting knowledge as well as higher sensitivity and language stimulation in regard to their 20 month olds. However, after 30, few links with age were found, and some aspects of parenting are immune from age such as parental investment and social play (Bornstein & Putnick, 2007). By age 30, mothers may be sufficiently settled in terms of their cognitive and emotional development that further shifts in their parenting are unlikely.

The older father, with more flexibility and freedom in balancing the demands of work and family, is three times as likely as a younger father to have regular responsibility for some part of a preschool child's daily care (Daniels & Weingarten, 1988). Moreover, the older father may be generally more involved in the parental role and may experience more positive affect associated with child-rearing (NICHD Early Child Care Research Network, 2000b). The fact that younger fathers tend to engage in more strenuous physical play with their children and older fathers to use more cognitive mechanisms in their play may reflect a reduction of physical energy rather than a less stereotypical view of men's and women's roles in parenting (Neville & Parke, 1997).

As family systems theory would predict, greater participation by fathers in caring for and playing with their children may help facilitate the more enjoyable and productive relations that older mothers enjoy with their children. Clearly, the timing of first parenthood is a powerful organizer of both maternal and paternal roles. Future investigations of marital and parenting interaction patterns need to consider timing as well as other factors.

Adoption: Another Route to Parenthood

Couples choose adoption for many reasons: Some are unable to conceive a child; some are older and thus at risk for some of the problems we discussed in Chapter 2; others may wish to avoid a family-related genetic disorder. In the United States, 2% to 4% of children are adopted (Stolley, 1993). Twenty or thirty years ago, people commonly adopted infants born in the United States. Today, however, because contraceptive methods are more effective, abortion is more available, and young unwed mothers often keep their babies, couples are more likely to find their little adoptees in other countries and/or among the numbers of developmentally at-risk infants and children in the United States. Currently, babies are most often adopted from China, Guatemala, Russia, South Korea, and Ethiopia (Adoption Guide, 2008). In 2006, nearly 22,000 foreign-born children were adopted into the United States, an increase of nearly 300% since 1990 (Centers for Disease Control and Prevention, 2008).

How do adopted children fare in terms of their development? There are two perspectives on this issue. According to one view, adoption is a protective measure if it removes an infant or child from adverse social conditions such as long-term foster care or institutional environments such as orphanages. Children who are able to escape these poor rearing environments through adoption have better developmental outcomes than children who remain in deprived and nonstimulating environments (Kreppner et al., 2007; Rutter, 2002). The success of adoption as an intervention, however, depends on a variety of factors, perhaps most important, on the age of the adopted child. Although children

who are adopted at any age from adverse circumstances fare better than those who remain for longer periods in such circumstances, being adopted early in life is clearly best. For example, early adolescents who were adopted from the infamous Romanian orphanages before they were 6 months old were similar to British adoptees who had not suffered early deprivation, whereas those who were adopted later had later adjustment problems (Kreppner et al., 2007). This suggests that a normal family environment can help adopted children catch up and develop normally if the child is adopted early.

Although many adopted children have not necessarily suffered the extreme adversity that characterized institutionalized Romanian infants, according to another view, adopted children are at greater risk for psychological problems, including hyperactivity, externalizing behavior, academic problems, and learning disabilities (Brodzinsky & Pinderhughes, 2002). In addition to age at adoption, several factors affect an adopted child's relative risk for developmental problems: Being a boy and having had more adverse prior experiences (e.g., multiple placements in foster care or being abused or neglected) are linked with poorer adjustment. At the same time, the vast majority of adoptees fall within the range of normal development, and the differences between the progress of adopted and biological children are often small (van London, Juffer, & van IJzendoorn, 2007). For most adopted children and for most couples who adopt, the benefits clearly outweigh the risks.

Gay and Lesbian Parents

Another recent change in the American family is the greater number of lesbian and gay parents. Although we have only estimates at the moment, most authorities suggest that there are somewhere between 1 and 5 million lesbian mothers and between 1 and 3 million gay fathers and that gay or lesbian parents are rearing between 6 and 14 million children (Patterson & Hastings, 2007).

Families with gay or lesbian parents are diverse. The largest group of children with gay or lesbian parents are children who were born to one of the parents before they established their same-gender relationship—that is, in the context of a previous heterosexual relationship or marriage. Within this group, there are two primary variations: When one of a child's biological parents declares a same-gender sexual preference and the couple divorce, the gay or lesbian parent may then form a new, homosexual relationship in which these partners together care for the child. In another arrangement, a gay or a lesbian couple who do not have children may choose to become parents. One partner in a lesbian relationship may choose to bear a child through donor insemination. Or the couples may adopt children.

Research suggests that heterosexual and lesbian mothers differ little in terms of self-concept, general happiness, and overall adjustment (Patterson & Hastings, 2007). We know less about divorced gay fathers because only a small minority of these men are granted custody of their children or live with them (Patterson, 2004). Most of our knowledge of gay and lesbian parenting comes from studies of couples who, after establishing their relationship, chose to become parents. Research that compared these couples' households with heterosexual households found that both gay and lesbian couples tended to share household duties more equally (Solomon et al., 2004). Among lesbian partners, biological mothers are more involved in child care, and nonbiological mothers spend longer hours in paid employment (Figure 11-11). At the same time, children in lesbian families, like those in heterosexual families, were likely to be better adjusted when both partners shared child care more or less equally, and lesbian parents were also likely to be more satisfied (Patterson & Hastings, 2007).

What about the children? Children of lesbian mothers develop in a normal fashion and do not have any greater emotional or social problems—including peer relationships and relationships with adults—than other children, nor is there any appreciable evidence of altered gender roles among lesbian parents' children (Wainright & Patterson, 2008) (see

Figure 11-11

Lesbian parents and paid employment

Among lesbian parents, biological mothers spent less time in paid employment (only 40% worked a full week) and more time in child care (a), whereas nearly three quarters of nonbiological mothers were engaged in full-time employment (b).

Source: Adapted from Patterson, 1995a.

(a) Biological mothers

25%

40%

35%

(b) Nonbiological mothers

24%

3%

73%

■ 40+ hours per week   ■ 21–39 hours per week   ■ 0–20 hours per week
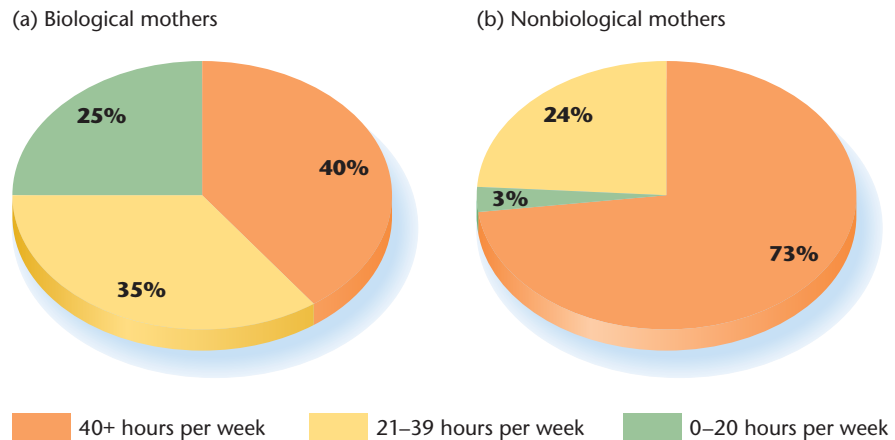
also Chapter 13). In similar fashion, the great majority of gay fathers' children grow up to be heterosexual adults. Nor are children of gay fathers victims of sexual abuse or at any significant disadvantage in comparison with children of heterosexual fathers. Although gay fathers undoubtedly face prejudice and discrimination, children have described their relationships with gay fathers as warm and supportive (Patterson, 2004).

Finally, we need to monitor the impact on same-sex couples of the ongoing legal and political discussion about same-sex marriage and the opportunities for these couples to adopt children. The available evidence suggests that greater societal acceptance of gay and lesbian parents will be beneficial for the children reared in these households.

Teen Pregnancy: Children Having Children

Why do teenagers have babies out of wedlock? The immediate causes include the facts that young people among all major cultural groups in the United States are initiating sexual behavior earlier and that people generally are marrying later. The underlying causes are complicated and difficult to combat. Poverty, being socially and economically disadvantaged, having models (parents and other adults) who also have children out of wedlock, and growing up too soon all play particularly important roles in early

Lesbian partners who choose to become parents tend to share child-rearing and homemaking tasks more equally than heterosexual couples.

teen pregnancy (Moore & Brooks-Gunn, 2002). Early sexual activity leads not just to unplanned pregnancies but also to declining school achievement and interest and to sexually transmitted diseases (STDs). Teenagers have the highest STD rates of any age group, and one fifth of all AIDS cases start in adolescence (Tinsley et al., 2004).

How many teen pregnancies are there in a year? As Figure 11-12 shows, birth rates for teenagers are high, especially for some nonwhite groups. However, birth rates for teens have declined in recent years; since 1990, rates for white teens have dropped 14% and for Latino teens 22% and, most dramatically, by 40% for African American teens (Child Trends, 2007). Minority U.S. teens are one and a half to two times as likely as European teens to bear children, and all together, American teenagers have almost one and a half times as many babies as United Kingdom adolescents, more than four times as many babies as teens in France, and more than eight times as many babies as are born to teenagers in Japan (Foundation for Child Development, 2007; Singh & Darroch, 2000). Although almost a quarter of teenage mothers are married, and another third have fairly stable relationships with the fathers of their babies, more than half face personal, economic, and social problems that make it very difficult for them to support and care for their children (Wakschlag et al., 2001). Thus, these half million babies have poor prospects, largely because of the economic constraints most teen mothers confront, and the younger the mother, the greater the risk.

> During the preschool years, signs of delays in cognitive development begin to emerge and tend to grow more evident as the children age. Preschool children of teen mothers also tend to display higher levels of aggression and less ability to control impulsive behavior. By adolescence, children of teen mothers have, on the whole, higher rates of grade failure and more delinquency. They also become sexually active earlier [and have] a greater likelihood of pregnancy before age 20. (Children's Defense Fund, 1998, p. 98)

According to one estimate, the sons of teen mothers are 13% more likely than others to be incarcerated, and daughters are 22% more likely to become teen mothers themselves (Children's Defense Fund, 2004). The negative effects on children are to some degree due to the less effective caregiving provided by teen mothers: They are less warm and provide less verbal and cognitive stimulation than on-time mothers. Although fathers sometimes either marry or provide support, many are unable to provide economic help or sometimes fail to get involved (Moore & Brooks-Gunn, 2002). Even the younger sisters of teenage mothers can be affected by the early arrival of a nephew or niece. Often, they must take time away from schoolwork to help care for the child, and they are at increased risk for drug and alcohol use and for becoming pregnant themselves (East & Jacobsen, 2001). Teen parents and their children pay huge prices,
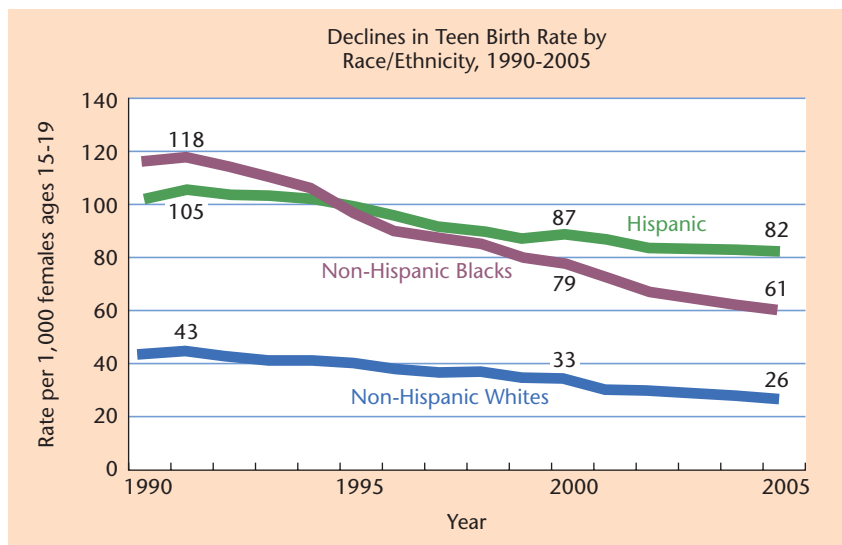
Figure 11-12

Changes in teen birth rates by race/ethnicity, 1990–2005

Among non-Hispanic U.S. African American and Hispanic American teens, birth rates peaked in the early 1990s but have been declining fairly steadily since that time. And birth rates for other teen groups have also been declining over the last decade or so. However, the United States continues to have the highest rates of teen pregnancy and births in the industrialized countries of the Western world.

Source: Child Trends, 2007.

and society pays in lost productivity and in the need to provide public care and services for disadvantaged children.

PREVENTION AND INTERVENTION   Teenagers whose parents are educated and financially secure as well as warm and responsive to their children have a better chance at avoiding teen pregnancy (Moore & Brooks-Gunn, 2002). A family's active involvement with religious beliefs and practices also is a protective factor that can help avoid early sexual activity and childbearing among the children. The use of contraceptives by teenagers who have initiated sexual activity can of course prevent pregnancy as well as serious and life-threatening sexual diseases. Fortunately, the rate at which teenagers use contraceptives has been increasing, but so has the rate of young people who are sexually active.

Once an unwed teen has become a parent, what are her options for avoiding some of the negative effects of early parenthood? Marriage is one of the most important routes out of poverty, largely because of the husband's income, but the divorce rate for this group is high. The failure of such marriages may be due to the immaturity of the young people and their inability to judge what makes for a good life partner.

Other factors help improve the outcomes for teen mothers such as getting a good education and limiting future births. In addition, when the children of unwed mothers have good-quality relationships with their fathers, they tend to achieve higher educational levels and to be less subject to depression and less likely to be imprisoned for misbehaviors or crimes (Moore & Brooks-Gunn, 2002). Particularly for African American children, having a stepfather join the family seems to have positive effects, increasing the likelihood that the children will be successful in life. In any event, if the mother's situation changes for the better, and particularly if she moves off welfare, becomes economically independent, acquires more education, or enters a stable marriage before her child becomes an adolescent, the child's adjustment and academic performance may be enhanced (Moore & Brooks-Gunn, 2002).

CHILD ABUSE WITHIN THE FAMILY

Although it is difficult to obtain precise figures on how many children in the United States suffer from maltreatment, it is estimated that every year between 1 and 3 million children are physically or psychologically abused and that the majority of these children are abused by family members (Child Trends, 2007). In 2005, Child Protective Services received reports of approximately 3 million cases of child abuse, about 900,000 of which were substantiated (Child Trends, 2007). Of these children, 16.5% were infants or toddlers and another 13.5% were 4 to 7 years old (U.S. Department of Health and Human Services, 2007). About 63% of the children who were maltreated suffered neglect, 17% suffered physical abuse, 9% suffered sexual abuse, and the rest suffered multiple kinds of abusive behavior (Child Trends, 2007). Because many instances of child abuse are not even reported or are discovered only after abuse has continued for a long time or the child is dead, these figures are conservative. Children are subjected to verbal abuse; they are starved, beaten, burned, cut, chained, isolated, left to lie filthy and in their own excrement, or sexually molested, and not a small number are murdered. In 2005, in the United States, more than 1,300 children died as a result of child abuse—almost four children every day (Centers for Disease Control and Prevention, 2005).

What can possibly lead to this inhuman treatment of children? Some of the contributing risk factors are characteristics of parents and their abused children, some are ecological factors such as the quality of the neighborhood and available support systems, and still others are life experiences and stresses that family members encounter. Abuse is unlikely to occur when only one risk factor is present. It is the presence of multiple risk factors and of interaction among them that often leads to abuse, especially when the family and the child have few protective factors such as a warm and caring marital

Child maltreatment Rates (per 1,000) by Race and Hispanic Origin, 2005
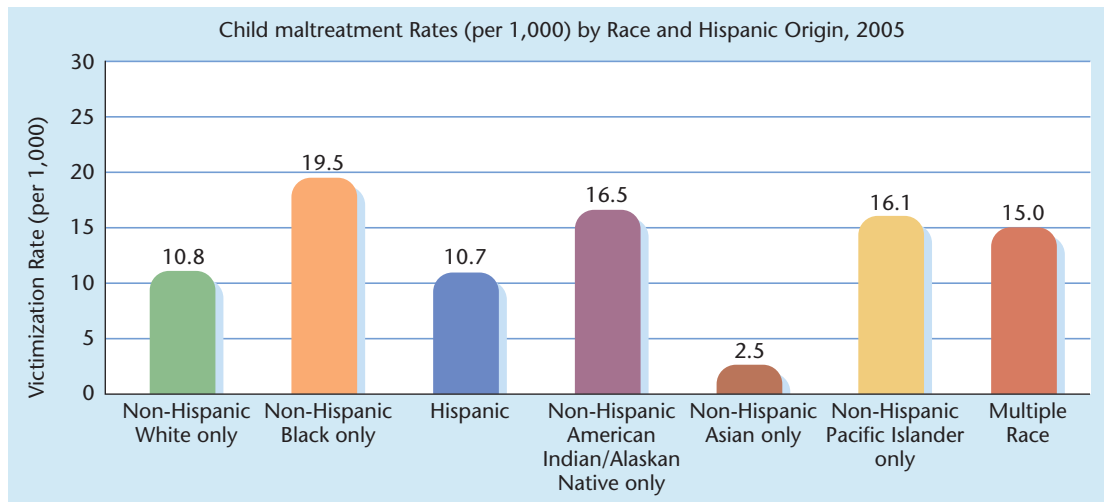
Figure 11-13

Child maltreatment rates (per 1,000) by race and Hispanic origin, 2005

Child abuse is more common in some ethnic groups than others. At present, the families in which children are most commonly mistreated tend to be African American, Native American, and non-Hispanic Pacific Islanders; people in these groups often find it difficult to obtain good jobs, typically receive low wages, and often live in areas where delinquency and crime are more common.

Source: Adapted from U.S. Department of Health and Human Services, 2007.

relationship, a supportive social network, accessible community resources, high intelligence, education, good health, and adaptability (Azar, 2002; Cicchetti & Toth, 2006). Many African Americans, Indians/Alaskans, and Pacific Islanders still live under such stressful conditions—poverty, substandard housing, lack of educational opportunities, and poor health—and it is in these groups that we find the most cases of child maltreatment (see Figure 11-13). Asians and European Americans—who tend not to live in circumstances of this sort—have many fewer cases of child abuse. Interestingly, Hispanic families have relatively low rates of child abuse, in part due to a higher rate of two-parent families and a strong sense of familism or commitment to family well-being. As we will see, ethnic differences of these kinds and other stress-related factors, such as single parenthood, probably account for these variations among U.S. subcultures.

Abused Children and Their Parents

Most students reading this book probably think that no one they know would ever abuse a child or that only someone who is really mentally ill would inflict grievous physical harm on defenseless children. However, although chronic maltreatment is most likely to occur in economically deprived, poorly educated families, child abusers are found in all social classes and all religious, racial, and ethnic groups. In addition, there is little evidence that severe mental illness or specific personality traits consistently distinguish abusive from nonabusive parents. Shocking as it may seem, mothers are frequently the persons who abuse children. Why might this happen? For one thing, some mothers feel locked into a stressful family situation, and mothers generally spend a good deal more time with a child than do other family members (Azar, 2002; Cicchetti & Toth, 2006).

Certain characteristics of the child and family are also associated with maltreatment of children. Child physical abuse is more likely to occur in large families and to children under the age of 3. A higher than normal incidence of birth anomalies, physical and

sexual abuse Inappropriate sexual activity between an adult and a child for the perpetrator's pleasure or benefit; the abuse may be direct (sexual contact of any type) or indirect (exposing a child to pornography or to the live exhibition of body parts or sexual acts).

intellectual deviations, irritability, negativism, and other behaviors that parents often find exasperating are seen in many of these children. **Sexual abuse** occurs from infancy through adolescence; for females, the peak onset occurs between 7 and 8 years of age, and for boys, the peak onset is in the years just before puberty. Female children are four times more likely to be victims of sexual abuse than male children (Azar, 2002; Feerick et al., 2006).

Two factors most commonly associated with abusive behavior are a distressed, often sexually unsatisfying marriage and the abuse of one or both marital partners by his or her own parents. Although incompetent, abusive parenting may to some extent be transmitted across generations (Azar, 2002), young parents are not locked into their own parents' style of parenting. Only about a third of parents who were abused when they were young abuse their own children (Cicchetti & Toth, 2006). Mothers who break this intergenerational cycle are more likely to have had a warm, caring adult in their background, to have established a close marital relationship, and at some time, to have received therapy (Egeland et al., 1988).

Abusive parents are likely to have unrealistic beliefs about parent-child relationships and to respond less appropriately to their children's behavior than do nonabusive parents. They often expect their children to perform in a manner far beyond what is normal for their stage of development or to exhibit levels of independence and self-control that are unlikely in children of their ages (Azar, 2002; Feerick et al., 2006). Compared with nonabusive mothers, abusive mothers show fewer positive behaviors toward their children and more severe negative behaviors, such as threatening commands, strong criticism, and physical punishment (Cicchetti & Toth, 2006). And the behavior of abusive parents is unpredictable and less contingent on the type of behavior the child actually exhibits (Azar, 2002). A mother's response may not distinguish between a tantrum and a task well done or between a smiling or a crying baby (Frodi & Lamb, 1980). They seem to be experiencing both the crying baby and the pleasant, happy baby as emotionally aversive. We have spoken earlier of the importance of parents' accurately reading and responding to children's cues. This distorted perception of the child's behavior must greatly increase the stress and confusion in already disturbed parent-child relationships.

The Ecology of Child Abuse

Recognizing that individuals and families do not operate in a social vacuum but are embedded in a variety of important social contexts outside the family can improve our understanding of child abuse (Azar, 2002; Cicchetti & Toth, 2006). This level of analysis—Bronfenbrenner's exosystem—includes neighborhoods and communities as well as schools, workplaces, peer groups, and religious institutions. The social support and guidance that these contexts provide can alter parental attitudes, knowledge, and childrearing practices, which in turn can modify the likelihood of abuse.

First, poverty makes a difference. Although violence against children occurs in all social classes, it is greater in poor families (Duncan & Brooks-Gunn, 2000). Several reasons have been suggested: Among them are the stressors associated with being poor, the greater number of single-parent families who live in poverty, the violence that often pervades poor neighborhoods, and limited access to social services. Although physical abuse and neglect both have been linked with poverty, sexual abuse has not and appears to be more common in middle-class families.

Neighborhoods matter, too. Some neighborhoods serve a protective or buffering function against abuse, whereas others seem to exacerbate the family's risk for abuse. Protective or low-risk neighborhoods have more social resources, and the families tend to use these resources—friends, neighbors, and relatives, as well as community centers—for advice, guidance, and physical and financial assistance in a balanced and reciprocal fashion. High-risk neighborhoods are less friendly places; people rely on each other for guidance and support less often and tend to exploit each other more when

they do exchange goods and services. Such neighborhoods are physically run down, dangerous, and experience high levels of residential mobility (Leventhal & Brooks-Gunn, 2000; Parke et al., 2008). And child abuse rates—even after controlling for race and poverty levels—are higher in the high-risk neighborhoods (Garbarino & Sherman, 1980).

Broad cultural changes in American society may play a role in the emergence of abusive patterns. For example, increased divorce rates, increased mobility, limited availability of day care, lack of medical coverage, and lack of paid family leave at the birth of a child may increase stress that may, in turn, contribute to abuse. A widespread indifference to violence or even acceptance of violence as a solution to social problems, including our culture's general acceptance of the physical punishment of children (Donnelly & Straus, 2005; Gershoff, 2002), may contribute to the rise in child abuse in American society. Child abuse is relatively uncommon in cultures like that of the Chinese, who rarely punish children physically. Thus, the cultural approval of violence, such as spanking in child-rearing, may sometimes combine with caregivers' lack of social, economic, and emotional resources to produce child abuse.

In summary, no single factor leads to child abuse. It involves complex interactions among dysfunctional family relationships, multiple stressful experiences, a disorganized or nonsupportive environment, and cultural values that tolerate or justify aggression and physical punishment.

Consequences of Abuse

The consequences of abuse are devastating. More than 1,300 children die each year; 65% of these children die as a direct result of physical abuse, and another 36% die from the consequences of neglect. And it is the youngest children who are most likely to die from abusive treatment: 77% of all the children who died from abuse or neglect in 2001 were younger than 4 years of age (Coser & Cohen, 2003). If abused or neglected children do not die, they may suffer brain dysfunction, neuromotor handicaps, physical defects, stunted growth, mental retardation, or serious psychological disturbance. Abuse can also slow intellectual development and cause psychosocial problems (Guterman, 2001).

Even as infants, physically abused children show less secure attachment and more noncompliant, resistant, and avoidant behavior toward their mothers (Cicchetti & Toth, 2006; Lyons-Ruth & Jacobvitz, 1999). Moreover, abused children are more likely to have problems in regulating their emotions, tend to show less prosocial behavior and empathy, and are more aggressive with their peers and more likely than nonabused children to be rejected by their classmates (Bolger & Patterson, 2001; Howe & Parke, 2001; Shields et al., 2001). In infancy and early childhood, sexually abused children, particularly girls, often display bed-wetting problems (called *enuresis*). Abused boys are more likely to have somatic complaints, such as stomachaches. Both boys and girls display inappropriate sexual behavior and have higher anxiety and social withdrawal. Among sexually abused children, delays in cognitive and academic development are common as well (Trickett & Putnam, 1998).

As abused children advance through the school years, they tend not only to show problems in relations with peers, teachers, and caregivers but also to have academic problems and low self-esteem, to exhibit behavior problems, and not surprisingly, to be depressed and withdrawn (Cicchetti & Toth, 2006). Problems are greater if abuse begins early (prior to age 5) rather than later (Keiley et al., 2001). Most abused children do not become delinquents or violent offenders. Long-term effects of abuse are most likely to appear if children remain in low-income socioeconomic environments with multiple stresses and few supports available (Cicchetti & Toth, 2006). In sexually abused children, it is common to find inappropriate sexual behavior directed toward themselves or other children and adults as well as play and fantasy with sexual content,

Making the Connections 11

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 11 and discussions in other chapters of this book.

**Chapter 11
The Family**

Pretend play between siblings is associated with better understanding of others' emotions.
In Chapter 6, "Emotional Development and Attachment," p. 201

Family poverty is linked with poorer intellectual development and school achievement.
In Chapter 10, "Intelligence and Achievement," p. 367

Divorce and father absence is linked with gender-role problems.
In Chapter 13, "Gender Roles and Gender Differences," p. 493

earlier menarche and onset of sexual activity, as well as sexual and obesity problems in adulthood (Centers for Disease Control and Prevention, 2005; Noll et al., 2007; Vigil et al., 2005). Higher rates of fears, nightmares, aggressive behavior, behavior problems, and self-injurious behavior have also been found (Cicchetti & Toth, 2006; Noll et al., 2006). Finally, more learning problems and poorer academic performance, as well as a greater number of attention-deficit hyperactivity problems, have been found in sexually abused children (Feerick et al., 2006).

Prevention of Child Abuse

A variety of strategies help reduce rates of abuse (Golden, 2000; Thompson, 1995). First, increasing parents' understanding of children's developmental timetables reduces unrealistic expectations about children's progress. Second, teaching parents nonpunitive disciplinary tactics, such as time-out and reasoning, can help decrease abuse rates. Third, providing support networks, both formal and informal, to reduce the isolation of abusing families is helpful. And fourth, as some argue, another way to lessen the incidence of child abuse in our society may be to change our tendency to tolerate and even justify the use of violence in dealing with interpersonal and social problems (Donnelly & Straus, 2005; Thompson, 1995).

SUMMARY

- The family is both the earliest and most sustained source of social contact for the child. The beliefs and values of the culture are filtered through the parents, whose interpretation is influenced by their own personalities, religion, social class, education, and gender. Although rearrangements in family ties are increasingly common, family relationships remain the most intense and enduring bonds.

- Parents, siblings, peers, and teachers are major agents of **socialization**. They may influence the child by directly teaching standards, rules, and values; by providing role models; by making attri-

butions about the child; and by creating the environment in which the child lives.

The Family System

- The family is a complex system involving interdependent members whose functioning may be altered by changes in the behavior of one member, or relationships among family members, and by changes over time. In addition, family functioning is influenced by the larger physical, cultural, and social setting in which the family lives.

- Family processes involve mutual influences among family members and adaptation to changes in family members and their relationships as well as to circumstances external to the family. In addition to the systems theory principles (Chapter 1), the family system is governed by the principles of interdependence and homeostasis and by the types of boundaries it establishes.

- The functioning of the marital system, parent-child system, and sibling system are interrelated and influence children's adjustment. A satisfying marital relationship affects the interactions with the children through more positive parent-child relationships.

- Marital conflict, which can affect children (especially boys) either directly or indirectly, is associated with negative feelings and behaviors directed toward the children and with disruptions in children's social and cognitive competence, particularly when conflicts are unresolved.

- Children have an impact on the marital relationship. Pregnancy and the birth of a first child are associated with a shift toward more traditional masculine and feminine roles so that the mother does more of the child care. Both mothers and fathers report declines in marital satisfaction following the birth of their first child. In addition, temperamentally difficult, deviant, or handicapped children place additional strain on the marriage and may be enough to destroy an already fragile marriage.

- Parents typically begin to systematically socialize their child during the second year by saying "no" to some behaviors and by praising other behaviors. They also teach social rules directly, serve as models with whom the child may identify or imitate, and choose the environment and social life that their child will experience.

- Parents' relationships with their children have been categorized along the dimensions of emotionality and control. Parental warmth and responsiveness are regarded as important to socialization, but some degree of parental control is necessary for positive social development. The goal is to teach self-regulation rather than continuing external control by the parents. Thus, discipline strategies that present alternatives and rely on reasoning are the most effective.

- The interaction of the dimensions of warmth and responsiveness with those of permissiveness and control creates a four-way typology: **authoritative**, **authoritarian**, **permissive**, and **uninvolved parenting.** Baumrind found that authoritative parenting involving high-warmth responsiveness and communication, but also consistent and firm control and high-maturity demands, led to the most positive emotional, social, and cognitive development in children and adolescents.

- Critics of this typology have cited the need to identify the components of each style that contribute to its effects on the child, the need to recognize the role of the child's temperament and behavior, and the question of the generalizability of the typology across cultures. The most effective Chinese style of parenting may fall somewhere between authoritative and authoritarian.

- **Coparenting**, in which ideally spouses or partners take a team approach in their child-rearing practices, can contribute to cooperation, cohesiveness, and harmony in the family. However, if parents compete with one another or fail to match each other's investment of time and energy in the work of parenting, the children may react with aggression, anxiety, or other kinds of problem behavior.

- The functioning of the family is affected by the number, gender, and spacing of the children. These factors influence both parent-child and sibling interaction. As family size increases, parents and children have less opportunity for extensive contact, but siblings experience more contact. This may result in greater independence but lower self-esteem and academic achievement in children from large families.

- Variations in family interactions are associated with birth order. Firstborn children often show emotional and behavioral problems after the birth of a sibling, but the outcome is mediated by the mother's reaction, by efforts to include the firstborn, and by the father's involvement. Parents stay more involved with firstborn children throughout life, have higher expectations, and require the acceptance of more responsibility.

- Different characteristics have been ascribed to firstborn and later born children. Firstborns are more adult-oriented, helpful, self-controlled, conforming, and anxious than their siblings, and they excel in academic and professional achievement. Although only children experience many of the same parental demands of firstborns, they do not have to compete with siblings; they tend to be high in achievement but lower in anxiety, and they make more positive adjustments in social relations.

- Eldest children are typically expected to assume some responsibility for younger children, and this may lead to either antagonistic behavior or to more nurturant behavior toward younger siblings. Eldest children focus on parents as sources of learning, whereas younger children use both parents and older siblings as models and teachers.

- The family unit is a distinct family subsystem and is responsible for the development and perpetuation of family stories and rituals, which transmit values, teach family roles, and reinforce the family's uniqueness.

Social Class, Ethnicity, and Socialization

- Subgroups within our culture have both divergent values and different problems with which to cope, and these alter the goals and methods of socialization parents choose.

- In addition to differences in income, education, and occupation, lower class and middle-class families differ in other ways. Poor families experience little power within the systems (e.g., education, health) that they encounter, leading to more helplessness and insecurity. They may be involved in cycles of disadvantage associated with accumulating risk factors that make child-rearing difficult and lead to adverse outcomes in later generations. However, the stresses experienced by poor families often result in the formation of extensive support networks, which involve both emotional support and services.

- Social class, ethnicity, race, and culture are related to differences in child-rearing. Among other things, child-rearing may differ according to whether a given cultural group emphasizes the **traditional nuclear family** or the **extended family**; the former is likely to be found among people who stress individualism, and the latter among those who stress the importance of the relationships between the individual and the group. Differences in child-rearing styles and their effect on children are also influenced by other systems—the workplace, the neighborhood, peers, and the school—that are influenced by culture and society.

The Changing American Family

- In recent years, family roles and forms have become more varied. As the number of working mothers has increased, the average size of households has decreased. Single-parent households have increased greatly in number due to rising divorce rates and increases in out-of-wedlock births.

- Effects of maternal employment have been attributed to the mother's reason for working, the mother's satisfaction with her role, the demands placed on other family members, the attitudes of the other family members, and the quality of substitute care provided for the children. If these are positive, maternal employment not only has no detrimental effects on children but may have specific positive effects, especially for girls.

- Children's self-care is growing in response to increases in maternal employment. Although self-care has positive features, such as encouraging children to take responsibility for themselves, there are risks for **latchkey children**, such as increased delinquency and substance abuse. After-school care programs, however, are beneficial, promoting better grades and lessening the occurrence of problem behaviors.

- Divorce, life in a one-parent family, and remarriage should be viewed as part of a series of transitions that modify family roles and relationships and the lives of parents and children. In the first year following divorce, the children in single-parent households tend to be more disturbed, but in the long run, most are able to adapt to their parents' divorce. However, single, custodial mothers suffer from task overload, a marked decline in income, and a lack of social support.

- Family interactions immediately following divorce are characterized by inept parenting on the part of custodial parents—usually mothers—and distressed, demanding, noncompliant behavior on the part of children. These effects last longer and to be more negative for preadolescent sons than for daughters.

- Children's responses to remarriage vary depending on the previous family experience, but the age at which the remarriage occurs is associated with the child's acceptance of the new parent. It is particularly difficult for adolescents to cope with a

parent's—or both parents'—remarriage. Antisocial behavior, depression and anxiety, school problems, and disruptions in peer relations have been associated with divorce and remarriage. In preadolescence, boys show the most negative responses to divorce, and girls show the most lasting resistance to remarriage; however, gender differences are rarely found in adolescence.

- Although in nearly 75% of divorce and custody cases the children reside with the mother, a divorced couple may select either **joint legal custody** or **joint physical custody** arrangements. Even when parents choose the latter, however, close to half of children live full-time with their mothers.

- The timing of first parenthood is a powerful organizer of parental roles. People are marrying and becoming parents later today than in earlier years. There are some positive aspects to later parenthood; parents may be better established in careers, feel more responsibility, and be more flexible about family roles.

- Between 2% and 4% of children in the United States are adopted, often from other countries. Adoption can protect infants and children by removing them from adverse rearing environments, such as orphanages. Adopted children are at high risk for psychological and academic problems, but age, gender, and prior living conditions determine the adopted child's risk for these sorts of problems. Most adoptees fall in the normal range of development.

- Gay and lesbian families are becoming increasingly common, whether composed of children from former heterosexual marriages or of children adopted or conceived by various assisted reproductive techniques. The children of gay and lesbian couples develop as children of heterosexual marriages do, that they generally adopt heterosexual lifestyles, and that their concepts of gender roles do not differ from those of children of heterosexual parents.

- Although births to teenage parents have declined somewhat, births to unwed adolescent mothers more than tripled between the 1960s and the 1990s. Largely because of economic constraints on unmarried mothers, the children of teen mothers are at risk for cognitive and academic deficits. These children are more likely to have behavior problems, less self-control, and more antisocial behavior, such as drug use and delinquency.

- Education, a comfortable economic situation, and religious faith can help to prevent teenage pregnancy, as of course can the proper use of contraceptives. Once a poor, unmarried teenager has had a child, getting an education, limiting future births, and forming a stable marriage may help her pull herself out of poverty and give her child a chance for good adjustment and academic performance.

Child Abuse Within the Family

- In 2005, nearly a million cases of child abuse or neglect were substantiated, another 2 million cases were reported, and the number of unreported incidents was unknown. The severe abuse of children is most likely to occur in the presence of multiple risk factors and the absence of protective factors such as community resources, good health, high intelligence, education, and a supportive social network.

- Child abuse is more likely to occur in large families, to children under age 3, and to children with physical and intellectual deficits or excessive fussiness and crying. Parents in abusive families often are socially isolated and have unrealistic beliefs about young children's abilities and about the parent-child relationship. Child abuse is preceded by escalating verbal and physical aggression that is often unpredictable and not contingent on the child's actual behaviors.

- Family members may engage in the **sexual abuse** of children when they are just infants. Girls are four times as likely as boys to be abused sexually; the peak years of such maltreatment are from 7 to 8. Among boys, the peak period of sexual abuse occurs in the years just before puberty. Child sexual abuse may lead to various somatic complaints, inappropriate sexual behavior, anxiety, social withdrawal, and delays in cognitive development and in academic achievement.

- Parents who abuse their children are frequently involved in a distressed marriage, have been abused by their own parents, and are unemployed, poorly educated, and economically deprived. No single factor leads to abuse. It is a product of the interactions among family characteristics, nonsupportive environments, and cultural values that tolerate aggression and physical punishment as well as poverty, unemployment, and high-risk, dangerous neighborhoods.

- The consequences of child abuse include less secure attachment in infants; poor emotional regulation and aggressive behavior in toddlers; and poor relations with peers and adults, academic problems, and low self-esteem as children get older. Brain dysfunction, mental retardation, neuromotor deficits, physical handicaps, and death can result as well.

EXPLORE AND DISCUSS

1. Consider our discussion of how families have continued to change across time. For example, more mothers work outside the home than ever before. What other changes have occurred in the past several decades that have modified our definition of a family?

2. Parenting is sometimes viewed as encompassing practices that are universal, but recent evidence suggests that culture shapes parenting practices. Based on your own experience and observations, do you think parenting is influenced by culture? Explain your answer.

3. Divorce has many negative effects on children's adjustment. It has been proposed that we should make it harder to obtain a divorce. What might be the problems with this proposal? Should the government be involved in decisions about divorce? Why or why not?

Pavel Kuznetsov (1878–1968). *Pushball*. Tretyakov Gallery, Moscow.

12.

Expanding the Social World: Peers and Friends

We have become increasingly aware, in recent years, of how important people outside the family are in socializing children. The roles that peers, friends, and teachers play in this process have gained significance as more and more mothers have begun to work outside the home and as preschool care and education have become more prevalent. This chapter focuses on how children's friends and peers contribute to their socialization.

Children's relationships with their peers differ from relations with their parents in several ways. In general, relations with peers are less enduring than those with family and especially parents. And interactions among age-mates are freer and more egalitarian. This greater fluidity offers children the opportunity for a new kind of interpersonal exploration. In particular, it facilitates the growth of social competence, it encourages a sense of social justice, and it opens the way for children to form relationships with people outside the family (Dunn, 2004).

We start out by looking at the child's first encounters with peers in early infancy. Then we examine the special roles peers play in children's socialization, such as modeling behaviors for each other. Next we consider the many factors that affect children's acceptance by peers, such as the ability to interact with others smoothly. We explore the kinds of problems that children can face in peer relationships and consider some ways of resolving them. Next we explore the roles of parents, teachers, and others in promoting children's acceptance by peers and look at the way children make friends. Then we turn to children's behaviors in groups, examining the way children form "pecking orders" and cliques, or groups of friends that are often exclusive. We then explore the special influence of peers in preadolescence and the teen years. Finally, we look at some cultural differences in peer relationships. Throughout these discussions, we will see changes over time in children's relations with their peers, changes that are reflected in our Turning Points chart on page 439.

HOW PEER INTERACTIONS BEGIN: DEVELOPMENTAL PATTERNS

Interactions with peers begin to shape children's behavior at an early age. Even in their earliest months, babies begin to react to each other, and when children begin to utter their first words and phrases, social interaction really gets under way. Gradually, children spend increasing amounts of time with peers, and by the time they're 3, toddlers generally prefer interaction with peers to that with adults (Dunn, 2004).

Infancy: First Social Encounters

Babies are really curious about each other! In the first 6 months of life, they touch and look at each other and are surprisingly responsive to each other's behaviors. If one child cries, another may cry, too. But these early responses can't be considered truly social in the sense of an infant's seeking and expecting a response from another child. It is not until the second half of their first year that infants begin to recognize a peer as a social partner (Brownell, 1990; Dunn, 2004). Between 6 and 12 months, an infant will start trying to influence another child by vocalizing, by looking at or waving at the child, or by touching him. Although babies do hit and push sometimes, a considerable amount of social behavior among the baby crowd is friendly (Eckerman & Didow, 1988; Rubin et al., 2006). Here's a classic example.

> Larry sits on the floor and Bernie turns and looks toward him. Bernie waves his hand and says "da," still looking at Larry. He repeats the vocalization three more times before Larry laughs. Bernie vocalizes again and Larry laughs again. Then, the same sequence of one child saying "da" and the other laughing is repeated twelve more times before Bernie turns away from Larry and walks off. Bernie and Larry become distracted at times during the interchange. Yet, when this happens, the partner reattracts attention either by repeating his socially directed action or by modifying it, as when Bernie both waves and says "da," reengaging Larry. (Mueller & Lucas, 1975, p. 241)

As children develop competence in interacting with peers, they shift toward increased social play and exhibit a clear preference for playing with peers rather than adults. In a classic study of social play in children between 10 months and 2 years of age, Eckerman, Whatley, and Kutz (1975) found that older children engaged in significantly more social play than younger ones but were less interested than the younger children in playing with their mothers and more interested in playing with peers.

Social exchanges with mothers differ from those with peers (Dunn, 2004; Rubin et al., 2006; Vandell & Wilson, 1987). Babies find mothers more reliable and more responsive than infants. Exchanges with mothers are longer and more sustained, but the interchanges may be a bit one-sided. Mothers tend to bear the larger responsibility for maintaining the interaction, whereas in exchanges between infant peers, the two partners contribute more equally. Mothers make it easy; peers make you work for your social life!

Social Exchange Among Toddlers

Between the ages of 1 and 2, children make gains in locomotion and language that increase the complexity of their social exchange (Dunn, 2004; Rubin et al., 2006). During this period, they develop the capacity to engage in complementary social interaction (Howes, 1987). That is, partners take turns and exchange roles in their play so that, for example, Jason may play "hider" and Samantha "seeker," and then Samantha may hide while Jason seeks. Peers also begin to imitate each other's activity and to show awareness that they're being imitated (Eckerman, 1993). Now, too, when children engage in

Turning Points

Age	
0–6 MONTHS	• Touches and looks at another infant and cries in response to the other's crying
6–12 MONTHS	• Tries to influence another baby by looking, touching, vocalizing, or waving • Interacts with other infants in a generally friendly way, but may sometimes hit or push another
13–24 MONTHS	• Begins to adopt complementary behavior (e.g., taking turns, exchanging roles) • Engages in more social play throughout the period • Begins to engage in imaginative play
25–36 MONTHS	• In play and other social interaction, begins to communicate meaning (e.g., invites another to play or signals that it's time to switch roles) • Begins to prefer peers to adults as companions
3 YEARS	• Begins to engage in complex cooperative and dramatic play • Starts to prefer same-gender playmates
4 YEARS	• Shares more with peers than 3-year-olds do
4.5 YEARS	• Begins to sustain longer play sequences • Is more willing to accept roles other than protagonist
6 YEARS	• Reaches a peak in imaginative play
3–7 YEARS	• Main friendship goal: coordinated and successful play
7 YEARS	• Shows stable preference for same-gender playmates
7–9 YEARS	• Expects friends to share activities, offer help, be physically available
8–12 YEARS	• Main friendship goal: to be accepted by same-gender peers
9–11 YEARS	• Expects friends to accept and admire him or her and to be loyal and committed to the relationship • Is likely to build friendships on the basis of earlier interactions
11–13 YEARS	• Expects genuineness, intimacy, self-disclosure, common interests, and similar attitudes and values in friends • Emergence of cliques
13–16 YEARS	• Important friendship goal: understanding of the self; beginnings of cross-gender relationships, often in group contexts • Development of crowds in the high school years
16–18 YEARS	• Expects friends to provide emotional support; increase in dyadic romantic ties and development of exclusive romantic alliances

Sources: Collins & Van Dulmen, 2006; Dunn, 2004; Ladd, 2005; Rubin, Bukowski, & Parker, 2006.

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental milestones.

positive social interactions, they're more likely to smile or laugh or display other kinds of positive affect (Mueller & Brenner, 1977), and their interactions last longer (Ross & Conant, 1992).

In the late toddler period (25 to 36 months), the child's main social achievement is the ability to share meaning with a social partner (Dunn, 2004).

> When children communicate meanings, they know how to suggest playing a particular game (eye gaze, plus run to wagon), the signal to switch roles ("my turn" plus a tug) and how to communicate that they share this knowledge . . . children's communication of meaning makes possible a wider range of games and variations on the themes of games, as well as early forms of pretend play. (Howes, 1987, p. 260)

Table 12-1

Types of play in preschool-age children

Solitary play
Children play by themselves and generally ignore other children who are near. About half of 2-year-olds engage in this type of play.
Parallel play
Two children play in similar activities, often side by side, but do not engage one another. This type of play is common in 2-year-olds but diminishes by the time a child is 3 or 4 years old.
Associative play
Children play with other children but do not necessarily share the same goals or agendas. They share toys and materials, and they may even react to or comment on another child's ongoing activities (e.g., sharing paints or remarking on another child's art work). However, they are still not fully engaged with each other in a joint project. This type of play is commonly seen in 3- and 4-year-olds, less often in 2-year-olds.
Cooperative play
At age 3–4, children begin to engage in this sophisticated type of play in which they cooperate, reciprocate, and share common goals. Some examples of cooperative play are building a sand castle, drawing a picture together, and playing a fantasy game in which characters interact with each other.

Table 12-1 summarizes Parten's (1932) classic description of the types of play that characterize the social exchanges of 2.5- to 4-year-olds. The complexity of toddlers' play increases over age: Solitary play and parallel play diminish as the child grows older, and associative and cooperative play both increase in frequency. There is of course overlap: Some 4-year-olds are still engaging in solitary play, while some precocious 2.5-year-olds are busily engaged in cooperative play bouts.

As children develop, negative exchanges and conflict also increase (Dunn, 2004; Hay & Ross, 1982; Rubin et al., 2006). In fact, socializing and getting into conflicts seem to go together. As Brown and Brownell (1990) found, toddlers who frequently initiated conflicts with peers were also the most sociable and the most likely to initiate interactions. It takes a little time to learn how to manage your social interchanges effectively.

relationship A continuing succession of interactions between two people that are affected by their shared past interactions and that also affect their future interactions.

As children become familiar with each other, their early peer interactions tend to develop into relationships. In a **relationship**, two acquaintances share an ongoing succession of interactions that continues over time and that affects each other (Dunn, 2004; Rubin et al., 2006). That is, in every encounter between the partners, both their history of past interactions and their expectations of future interactions influence the nature and course of events. Toddlers develop relationships that are based on both positive and negative exchanges (Ross et al., 1992). In their simple give-and-take exchanges, these young peers display an elementary form of friendship. Interestingly, children between 1 and 2 develop preferences for particular playmates: It is a clear sign of early friendship formation that not just any other child will do. And these early social choices of special friends are not temporary: 50% to 70% of early friendships last over a year and, in some cases, over several years (Dunn, 2004; Howes, 1996). Nor are early relationships limited to just dyads: Even 2-year-olds can interact in a three toddler group and exhibit not just dyadic but triadic, or three-way, interchanges as well (Ishikawa & Hay, 2006). Clearly, toddlers are capable of more complex social exchanges than we previously thought. We explore the topic of friendship in some detail later in the chapter.

Preschool and Elementary School Society

As children move into preschool and elementary school, they continue to seek and engage in more and more peer interactions. With whom do children of various ages
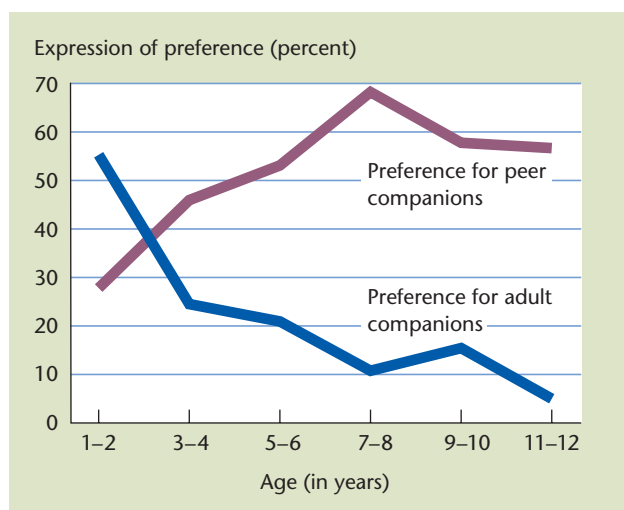
Peers preferred

At about the age of 2.5, children begin to prefer other children as companions, and their choice of adults for companionship dwindles rapidly over time.

Source: Ellis, Rogoff, & Cromer, 1981.

spend time? In their study of social interaction, Ellis et al. (1981) found that the 400 children they observed were alone 26% of the time, with other children 46%, and with adults and peers 15% of the time. As Figure 12-1 shows, over time, children spend more hours with child companions and fewer with adults. These trends continue into adolescence, when children spend more time either alone or with friends (Larson, 1997).

Larson (1997) found that among both European American and African American preadolescents and adolescents, talking with peers increased dramatically between ages 10 and 15. Interestingly, when Larson (Larson & Verma, 2000) compared U.S., Korean, and Japanese 12th graders, they found that the U.S. teens spent more than twice as much time each day talking with each other (2.5 hours/day) than did the Korean and Japanese teens (1.0 hours/day).

The kinds of peers children choose to spend time with change also. Age becomes a more important factor; for example, companionship with peers of the same age grows over time. Gender, too, begins to matter. Up to age 3 or 4, children choose same- and opposite-gender companions, but after this, both boys and girls prefer same- to opposite-gender play partners. Adolescence, of course, heralds a reversal, as cross-gender friendships begin to blossom once again (Richards et al., 1998; Rubin et al., 2006) (see Figure 12-2).

HOW DO PEERS HELP TO SOCIALIZE CHILDREN?

Peers play a role in socializing children, just as families do. Peers offer a perspective quite different from that of the family—the perspective of equals who share common abilities, goals, and problems. How does the peer group influence the child's development? In many of the same ways parents do—through modeling, reinforcement, and social comparison and by providing opportunities for learning and socializing.

Modeling Behaviors

Peers influence each other by serving as social models. Children acquire knowledge behaviors simply by observing the behavior and actions of their peers. For example, Colin is spending his first day at a new school. Through observing the other students, he rapidly learns that children are expected to stand when the teacher enters the room, that it is risky to shoot spitballs, and that he should avoid the big redheaded kid because

Figure 12-2

Girls/boys aren't so bad after all

This study showed that both girls and boys in elementary and middle school generally chose same-gender others for companions (a), but that beginning in the ninth grade, the amount of time children spent with opposite-gender friends increased significantly, especially for girls, who mature earlier than boys (b).

Source: Richards, Crowe, Larson, & Swarr, 1998.
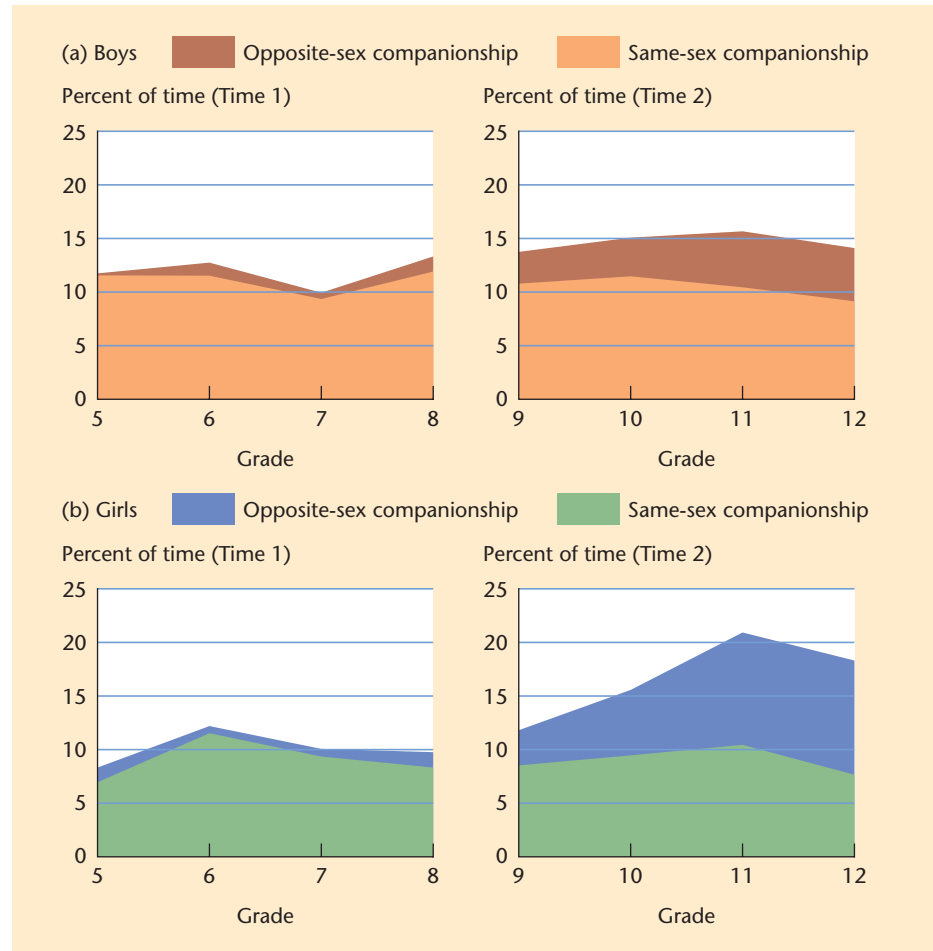
he's the class bully. Colin may learn new social skills by modeling, or imitating, Melissa and Tom, who appear to be the class leaders and more socially skilled than some other members of the class (Grusec & Abramovitch, 1982).

Children also imitate older, more powerful, and more prestigious peer models (Bandura, 1989; Rubin et al., 2006). But imitation serves other purposes besides rule learning. It can often be an important way of maintaining social interaction. As Eckerman (1993) has shown, even in 2-year-olds, imitation sustains joint play between partners and leads to more sophisticated forms of play in social games such as tossing a ball back and forth.

As we will see, in many cultures, siblings are primary caregivers for infants and toddlers. This allows the young child to learn from peers of different age groups. Some writers have suggested that the rigid age grading common to many Western institutions such as schools and sports organizations may alter or at least limit children's opportunities to learn. What do you think?

Teaching and Reinforcing

As children develop, they begin to reinforce their peers' behaviors. To *reinforce* is to pay attention to another's behavior, to praise or criticize it, or to share in it. No one knows this better than parents—especially parents of adolescents—who often bemoan the fact that their children ignore wise parental advice and instead listen to, and emulate, their peers. As the concept of "peer pressure" implies, peers can convince children and adolescents to take risks and engage in deviant behavior. Clearly, peers' influence

can be harmful as well as beneficial. Throughout the preschool years, peers are increasingly likely to reinforce each other: One study found that 4-year-olds praised, attended to, or shared with their peers significantly more than 3-year-olds did (Charlesworth & Hartup, 1967). And reciprocity begins to grow, as nursery schoolers reinforce the same peers who reinforce them (Hartup, 1983). The notion that peer reinforcement in the form of attention and approval affects a child's behavior patterns has considerable research support. Peers' differential reinforcement can produce significant changes in the target child's behavior (Furman & Gavin, 1989; Rubin et al., 2006).

Children respond to negative reinforcement, too. Just think of the looks and comments an adolescent who wears the wrong clothes is likely to elicit or of the reactions preschoolers are likely to get if they play with toys regarded as meant only for the opposite gender. Peers can quickly whip an errant child into shape by looks or biting comments or by ostracizing the child from the group (Lamb & Roopnarine, 1979).

Interaction with peers also provides an opportunity for specific instruction and learning (Ladd, 2005; Zarbatany et al., 1990). In Western cultures, one can see this in school games and sports and in tutorial arrangements, in which children teach each other and acquire new skills together. In some other cultures, such as those of India, Kenya, and Mexico, both older peers and siblings teach and are caregivers for young children (Maynard, 2002; Rogoff, 2002; Whiting & Edwards, 1988).

Social Comparison and the Developing Self

Peers may help a child develop her self-image and self-esteem by providing standards against which to measure herself. There are few objective ways to rate one's own characteristics, abilities, and values, and children turn to other people, particularly to peers, for help. Through **social comparison**, children watch and talk with their peers and then use what they've learned to evaluate themselves.

Research has shown that in the early elementary school years, children display a marked increase in their use of social comparison, with the peer group as a common means of self-evaluation (Harter, 2006; Ruble, 1987; Zarbatany et al., 1990). And the child's self-image and self-acceptance are closely associated with how he is received by peers. This social comparison process helps the child define his own self-image and self-esteem (Harter, 2006). How well children think they "stack up" against their peers

social comparison The process by which we evaluate our own abilities, values, and other qualities by comparing ourselves with others, usually our peers.

Tugs of war and other play activities help kids compare their abilities with those of others.

plays a major role in the development of their self-esteem. If you think you are as good as your peers, your self-esteem is high, but if you see yourself as falling short, your self-esteem suffers.

How do we choose the particular person with whom we want to compare ourselves? It's likely that if a child wants to know how good a fighter he is, he thinks about how he's done in neighborhood scuffles and how tough his peers seem to think he is; he doesn't compare himself with Mike Tyson. If a child wants to evaluate her reading ability, she most probably compares herself with other children in her class; she's pretty unlikely to judge herself by how many words her mother can read or by how rapidly her teacher reads. As a basis for self-definition, the peer group is unequaled.

PEER ACCEPTANCE

Children place enormous significance on being accepted by peers, and peer acceptance is of great importance to children's social development. Interacting with peers is the child's first experience of social behavior beyond the family, and when this experience is positive, it can help lay the foundation for healthy adult social behavior. In this section, we look first at the ways psychologists study peer acceptance and assess children's status among their peers and at their discoveries about the factors that affect children's judgments of others. Then we examine the way children are affected by their peers' view of them and interactions with them. Based on our findings here, we go on to consider how we can promote healthy social interaction in children.

How Do We Study Peer Acceptance?

A common way of studying peer acceptance is to measure and compare the status of each child in a specific peer group. To do this, developmental psychologists generally use **sociometric techniques** in which they ask children to rate peers on scales of aggressiveness or helpfulness or to compare peers as to likability or to identify those whom they like best (Ladd, 2005).

Why do psychologists ask children, rather than teachers or other adults, to provide them with data on children's peer status? First, as insiders in the group, peers see a wider range of relevant behaviors than do adults. Second, peers have extended and varied experience with each other. And third, by gathering data from many individuals who've interacted with the child who is the subject of study, we prevent any single individual's view from dominating our results.

Let's look at a method of study called the *nominations technique*, in which an investigator begins by asking each child in a group to name a specific number (usually three) of peers whom he likes "especially" and the same number of peers whom he doesn't like "very much." Next the investigator sums the scores of all the "like most" and "like least" choices and assigns children to one of several groups. **Popular children** are those who have received the greatest number of positive nominations and the fewest negative ones. Children whom their peers judge popular are friendly and assertive but not disruptive or aggressive. When they join a play group, they do it so smoothly that the ongoing action can continue without interruption (Black & Hazen, 1990; Newcomb et al., 1993). Children like this are good at communication; they help set the rules and norms for their groups, and they engage in more prosocial behavior than less popular children.

Not all popular children fit this profile. Some children who are perceived as popular are also characterized as athletic, cool, dominant, arrogant, and both physically and relationally aggressive. These children and adolescents may wield high levels of social influence even though their actions are often manipulative in nature (Cillessen & Mayeux, 2004; Cillessen & Rose, 2005; Rodkin et al., 2000). In short, there is more than one pathway to popularity.

sociometric technique A procedure for determining children's status within their peer group; each child in the group either nominates others whom she likes best and least or rates each child in the group for desirability as a companion.

popular children Children who are liked by many peers and disliked by very few.

Average children receive some of both types of nominations but are neither as well liked as popular peers nor as disliked as peers in other categories. **Neglected children** are isolated, often friendless children but aren't necessarily disliked by classmates; they receive few like or dislike votes. And children termed neglected are less aggressive, less talkative, and more withdrawn. **Controversial children** receive many positive nominations but also a lot of negative ones. **Rejected children** receive many negative nominations. **Aggressive rejected children** are characterized by aggressiveness, poor self-control, and behavior problems, whereas **nonaggressive rejected children** tend to be anxious, withdrawn, and socially unskilled (Bierman et al., 1993; French, 1990; Ladd, 2005; Parkhurst & Asher, 1992).

However, as we saw in our discussion of popular children, aggressive children who are competent and develop social networks are unlikely to be rejected and may even be popular (Cairns & Cairns, 1994; Rubin et al., 2006).

Factors That Affect Peer Status

Once we've placed every child in a group somewhere in this mixed bag of categories, we need to find out what reasons underlie the judgments made by each child's peers. What factors influence children's appraisals of one another? Research suggests that probably the single most significant factor is a child's cognitive and social skills—his or her ability to initiate interactions with others, to communicate effectively and interact comfortably with them, to be responsive to others' interests and behaviors, and to cooperate with others in play and school activities (Coie et al., 1990; Rubin et al., 2006; Schneider, 2000). In this section, we focus first on exploring these kinds of skills and the ways children develop them.

We also have to look, however, at some less crucial factors in peer acceptance that are as influential with children as they are with adults. When people meet others, especially for the first time, they are likely to base their initial appraisals of the person on such superficial characteristics as name or physical appearance or even enduring characteristics such as race, gender, or age. Unfortunately, children often do this, too.

ACQUIRING SOCIAL-COGNITIVE SKILLS Think about how you react when new people join a group of which you're a member. What do you think of a person who smiles in a friendly way and asks you about yourself and the group? What do you think of someone who stands on the edge of the group and makes no effort to approach anyone? Which person would you be most likely to chat with or invite to join you in a particular activity? Probably, the first, although of course there are always extenuating circumstances.

In the same way, the child who asks new acquaintances for information (e.g., "Where do you live?"), offers information (e.g., "My favorite sport is basketball"), or invites another child to join in an activity (e.g., "Wanna help me build this fort?") is well on the way to being accepted by the group (Rubin et al., 2006). On the other hand, the child who tries to initiate social interaction by hovering about a group silently or by making inappropriate or aggressive remarks is behind before she gets started. To feel comfortable approaching a new social situation, a child needs to want to interact with others, to feel confident that she has something useful to contribute to the group, and to be interested in learning what others in the group are like—what their interests are and what they think about many things.

PROCESSING AND ACTING ON SOCIAL INFORMATION Approaching a new social situation is similar to solving a cognitive problem or puzzle. A child approaching that new group of peers needs to understand others' communications clearly, to interpret their behavior accurately, to formulate her own goals and strategies based on these interpretations, to make useful decisions, to communicate

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average children Children who have some friends but who are not as well liked as popular children.

neglected children Children who are often socially isolated and, although they are not necessarily disliked by others, have few friends.

controversial children Children who are liked by many peers but also disliked by many.

rejected children Children who are disliked by many peers and liked by very few.

aggressive rejected children *Rejected* children who have low self-control, are highly aggressive, and exhibit behavior problems.

nonaggressive rejected children *Rejected* children who tend to be anxious, withdrawn, and socially unskilled.

Figure 12-3

An information-processing model of children's social behavior

The model outlines the way children perceive and interpret a social situation, decide what they want to achieve in that situation, choose a behavior they think likely to accomplish their goal, and act on their decisions (steps 1–6). Note that the child's "database" consists of memories of other situations and acts, learned rules of social behavior, and her general social knowledge. As the double arrows indicate, the child's thinking and action both draw on the database and contribute to it. The dashed-line arrows point out that the child may refer back to the preceding step and perhaps change her plan for the one she's about to take.

Source: Adapted from Crick & Dodge, 1994.

Database
- Memory store
- Acquired rules
- Social schemas
- Social knowledge

4. Review possible actions

5. Decide on an action
- Review possible outcomes
- Evaluate likely response
- Evaluate self-efficacy
- Select action

3. Clarify goals

6. Act on decision

2. Interpret cues
- Attribute causes
- Attribute intent
- Evaluate goal
- Evaluate past performance
- Evaluate self and others

1. Encode cues
(one's own thoughts as well as others' behaviors)

clearly to others, and to try out and then evaluate her strategies. This is quite a large order, especially for a young child, and some are better at it than others. To examine the interplay of these complicated functions in a social situation, Crick and Dodge (1994) devised the model of social information processing illustrated in Figure 12-3. Although the model stresses the cognitive steps in evaluating problems that a child confronts when interacting with others, it is important to remember that individual biological predispositions, such as a tendency to be impulsive, also play a role in accounting for variations in the decision-making process (Dodge & Pettit, 2003). As we study a child's progress through this scheme of processing, we'll see that at every one of the six steps outlined, the child must make a decision or take an action that may be accurate or inaccurate, helpful or unhelpful.

Rochelle, 7 years old and quite socially competent, approaches two children playing a board game. She notices that one of the girls smiles at her in a friendly way (step 1, encode cues). She concludes that the girl would like her to play, too (step 2, interpret cues), and decides that she wants to make friends (step 3, clarify goals). Next, she reviews possible actions to further her goal—smile back, ask to join in—and considers how the girls might react to each possible choice (step 4, review actions/responses). Rochelle decides to make a friendly comment about the girls' game (step 5, decision). Just then, the smiling girl looks up again, and Rochelle smiles back and says, "Looks like fun" (step 6, act). The girls invite her to play the next game.

Now replace Rochelle with Jamie, 6 years old and less competent socially. Jamie sees two boys playing, but because he's looking at their sneakers, he misses the friendly look one boy gives him (step 1, encodes the wrong cues). Jamie decides that the boys are unfriendly (step 2, incorrectly interprets cues) and wonders what he might do. He thinks of some hostile things—ask the boys why they don't ask him to play, call them mean—and fails to consider how they might react (steps 3 and 4, fails to both clarify goal and review possible acts and responses). Jamie decides on the latter approach (step 5, decides) and blurts out, "You two are really selfish not to let me play!" (step 6, acts). It's no great surprise that the boys ignore him and move off.

Using these models, Dodge (1986) and his colleagues compared 5- to 7-year-old children who were rated either socially competent or socially incompetent by their teachers and peers. They presented children with a videotape of situations similar to the ones just described where a child is trying to join the play of two other children and asked their participants about what they would do in each of five steps (the researchers omitted step 3 in this study). Predicting that children of different levels of competence would respond differently, the researchers found just that. The incompetent children were less likely to notice and interpret the cues correctly, generated fewer competent responses, chose less appropriate responses, and in the next phase of the experiment, were less skilled at actually enacting or carrying out the behavior. The researchers then asked the children to participate in an actual peer-group entry task with two peers from their classroom. Measures of each of the five steps in the model predicted children's competence and success at this task; children who understood what to do were better at the real task of gaining entry into the peer group (see Figure 12-4). These studies provide strong support for the role of cognitive factors in understanding children's social relationships with peers. Deficits in social understanding can lead to poor social relationships. In this case, thought and action are clearly linked.

Let's look at some of these steps in more detail, for others have found support for many of the components of the Crick and Dodge model. First, rejected children, especially aggressive ones, tend to view others in hostile terms and to make hostile attributions about other peers' intentions (Burks et al., 1999). Second, not all children have the same goals and strategies in social situations. Chung and Asher (1996) suggest that one needs to be aware of one's goals in a social situation and to have the ability to devise a few strategies to achieve those goals. Not surprisingly, certain kinds of social goals tend to be accompanied by certain kinds of strategies. For example, children who want to have relationships with others are more likely to use prosocial strategies in interacting with their peers. On the other hand, children who want to control others may choose hostile and coercive strategies.

Why do some children develop positive goals and strategies and others negative goals and behaviors? One important explanation is that children differ in the way they
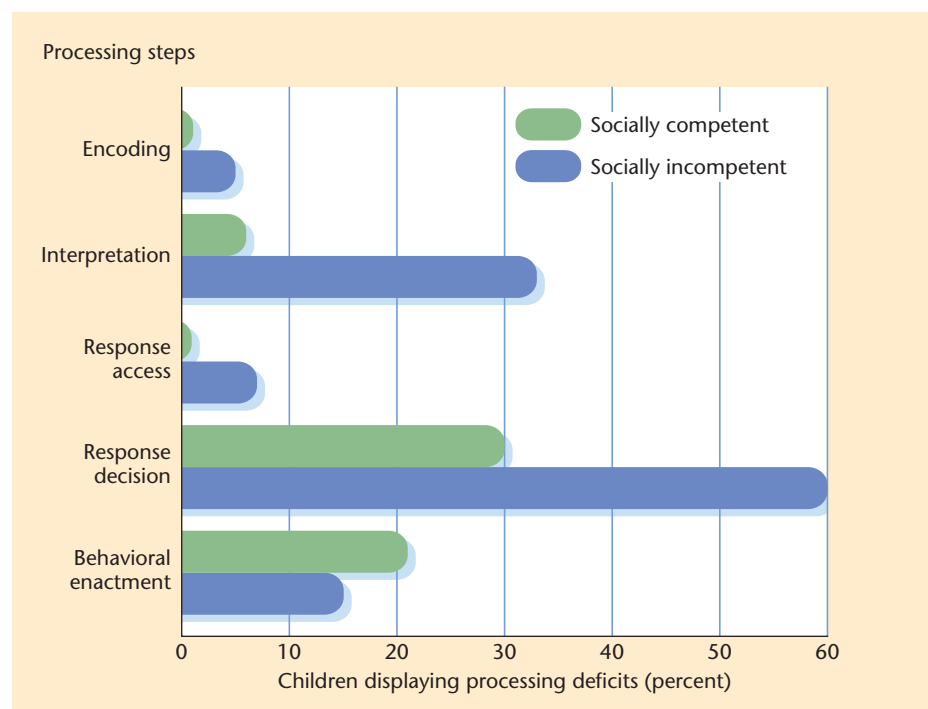
Figure 12-4

Social competence and social processing skills

Children who were more socially competent and better adjusted displayed fewer deficits in their ability to process cues and other information in social situations than children who were socially incompetent.

Source: Adapted from Dodge et al., 1987.

perceive themselves and in the way they explain why they are sometimes successful at a task and sometimes unsuccessful.

Clearly, a child who thinks he didn't succeed at something because he just didn't try hard enough may well try again, but the child who believes that there's something lacking within himself may give up. Dweck, whose research on children's implicit theories of personality we explored in Chapter 9, suggests that one way to circumvent the latter kind of thinking is to prevent the child from seeing a task or problem as a measure of ability and instead to focus the child's attention on just trying out something new and possibly useful (Dweck, 2006).

In a study testing this notion, Erdley et al. (1997) told children that they were trying out for membership in a pen-pal club, and they divided the children into a learning-goal group and a performance-goal group. The researchers told the children in the first group that the important thing was that the task would help them "practice and improve" their ways of making friends. "So think of it as a chance to work on your skills," they continued, "and maybe learn some new ones." They told the children in the second group that what they were interested in was "how good" they were at striking up new friendships: "Think of it as a chance for you to see how good you are at making friends."

The children given the learning goal were more persistent and ultimately more successful than the children given the performance goal. The latter were much more likely to give up (Dweck, 2006; Ladd, 2005). This work is consistent with Bandura's social self-efficacy theory that we outlined in Chapter 1.

It is important to recognize that the relations between the information-processing steps in the model and actual behavior with peers are reciprocal. Although we assume that biased processing of social information leads to maladaptive social behavior and poor peer acceptance, the model recognizes that maladaptive behavior over time can lead to the development of social-information-processing deficits as well (Gifford-Smith & Rabiner, 2004). For example, Dodge and his colleagues (2003) found that children who were rejected by peers in kindergarten became, as the researchers predicted, less competent social processors in grades two and three. The experience of early peer rejection, either by confirming biased processing patterns or by limiting a child's ability to acquire necessary social experience, leads to greater cognitive deficits, which in turn contribute to maladaptive behavior and less acceptance by peers.

BEAUTY MAY BE ONLY SKIN DEEP, BUT IT'S WAY COOL

When they encounter someone new, children are just as likely as adults to base their impressions on the person's physical appearance. As you'll recall from Chapter 4, when newborns view pictures of unfamiliar faces that have been judged "attractive" and "unattractive," they look more at the attractive ones (Langlois et al., 2000; Slater et al., 2000). And 3-year-olds show the same preference, choosing attractive over unattractive faces (Langlois, 1985).

People in general tend to attribute positive qualities to those who are physically attractive, and children and adolescents go right along with this tendency (Hawley et al., 2007; Langlois et al., 2000). Children expect to find characteristics such as friendliness, willingness to share, fearlessness, and self-sufficiency in good-looking peers and often think unattractive children are likely to be aggressive, antisocial, and mean. Teenagers almost uniformly prefer good-looking partners, viewing unattractive ones as unacceptable.

Have our expectations that attractive people will demonstrate positive characteristics and behavior any basis in reality? Langlois and her colleagues (2000) confirmed many of these expectations and underscored that beauty and attractiveness may be more important than we thought. Attractive children are judged more positively (higher on social appeal, adjustment, and interpersonal competence) than unattractive children—even by those who know them. You get treated better if you're attractive, too. The more attractive children were treated more positively and less negatively by others, even by people who were familiar with these children. Finally, attractive children were more popular, better adjusted, and even displayed greater intelligence. Perhaps it's time to

reevaluate our cultural myths: Beauty is more than just skin deep after all (Langlois et al., 2000).

Timing of puberty matters as well. Recall from Chapter 6 that boys who are early maturers tend to be more readily accepted by older peers. On the down side, this leads to more risk taking and problem behavior as well (Ge et al., 2002). Early maturing girls, on the other hand, have a smaller network of close friends and more adjustment problems than on-time or late maturing females (Stice et al., 2001).

"WE LIKE TO HAVE (BOYS) (GIRLS)"   Preschoolers Jake and Danny are playing on the big swing, and Laura runs up, calling excitedly, "Can I get on?" "No!" says Jake emphatically, "We don't want you on here. We only want boys on here." When researcher Zick Rubin asks why the boys won't play with Laura, Jake replies simply, "Because we like boys—we like to have boys" (Leaper, 1994). Up to the age of 7, children are usually willing to play with peers of either gender, but as you see, even in the preschool years, gender discrimination can occur!

The tendency to gender exclusivity increases throughout elementary school (Maccoby, 1998), and it's not until early adolescence that children once again choose opposite-gender companions—this time, as dates. There are exceptions to this rule, but they often operate underground. For example, a girl and boy may spend time together in church work or in neighborhood activities but keep their friendship a secret from classmates (Gottman, 1986; Thorne, 1986). Too bad, say some researchers, for cross-gender play can introduce both boys and girls to a broader range of behavioral styles and activities (Rubin, 1980). It can expand their pool of potential friends and promote a better understanding of qualities that are often shared by both sexes.

Third and fourth graders who had cross-gender friendships as well as same-gender friendships were among the best-accepted, socially skilled children in the group (Kovacs et al., 1996). In contrast, children whose primary friendships, or only friendships, were with opposite-gender peers were less well accepted, judged less skilled academically and socially, and tended to report lower self-esteem. Similarly, others have found that boys who had girls in their friendship networks reported greater intimacy with their same-gender best friends (Zarbatany et al., 2000). We return to the issue of gender segregation in Chapter 13.

It is important not to exaggerate the differences in peer relationship styles of boys and girls (Underwood, 2004). Boys and girls participate in both cooperative and competitive activities. Team sports, for example, foster both types of goals. And as we will see in Chapter 14, girls can be as aggressive as boys but generally express aggression differently. In addition, recent work has questioned the claim that boys' and girls'

Boys in the elementary school years still tend to choose same-gender playmates for team sports. However, as interest in girls' team sports continues to grow, we may see changes in playmate choices over time.

BOX 12-1

Risk and Resilience

VICTIMIZATION BY PEERS: IT HELPS TO HAVE FRIENDS

Peer victimization occurs when a child is bullied by other peers. This kind of persecution can take several forms. Some children physically attack or threaten others, especially boys, with physical harm if they don't obey their peers (Perry et al., 2001). Girls, on the other hand, are more likely to be targets of **relational victimization**, in which peers try to damage or control their relationships with others. For example, a girl may be excluded from an important event such as a birthday party when she fails to comply with a peer request, or she may be the target of a hostile rumor within her peer group (Crick et al., 1999; Ostrov & Crick, 2006; Underwood, 2004). Both of these forms of victimization have harmful consequences for children's adjustment. Victimized children are more anxious, depressed, and lonely (Nangle et al., 2003). They are more likely to be

rejected by peers, to hold more negative perceptions of their own competence, and to experience greater school adjustment problems and more loneliness and depression (Ladd & Troop-Gordon, 2003; Olweus, 2001). Not surprisingly, the longer a child is exposed to victimization, the greater the toll in terms of increasing internalizing difficulties (Goldbaum et al., 2003).

Some children are the regular targets of victimization, and it's unfortunate that, although we can often identify these victims of aggression early, they frequently remain victims throughout the school years (Khatri et al., 1994; Kochenderfer-Ladd & Wardrop, 2001). Cross-national surveys suggest that from 6% to 22% of children report moderate to severe levels of peer abuse while in school or traveling to or from school (Nansel et al., 2001).

Ignoring another child or purposely excluding her from a conversation or activity can be a form of relational victimization.

peer victimization Ill treatment of one child by another (or by others) that can range from teasing to bullying to serious physical harm; typically, victimizing is a continuing behavior that persists over time.

relational victimization The attempt by a peer to damage or control another child's relationships with others.

social networks are different in size or structure; for example, girls and boys are equally likely to be central members of their respective cliques (Bagwell et al., 2000; Cairns & Cairns, 1994). There are many similarities in the behaviors of boys and girls in their respective peer relationships.

WHAT'S IN A NAME? OR AN AGE? Children learn very quickly what given names are popular among their peers and thus "acceptable," and often, they may think another child's name "funny" or worry that their own name is odd. As a result, they're more likely to be friendly to a peer with a name that's familiar to them, such as Michelle or Jason, than to a child with a name that's currently out of favor, such as Hor-

Who are these children that peers pick on, tease, or attack? Some are children who, unwittingly, send implicit signals that they are unlikely to defend themselves or retaliate. These children may cry easily, they may exhibit anxiety, or they may appear weak (Hodges & Perry, 1999). They tend to lack self-esteem and self-confidence, and they're often missing a sense of humor. And again, without realizing it, they may encourage their attackers by being submissive, by not being very good at persuading others, or by giving in to a bully's demands and surrendering possessions (Crick et al., 1999; Juvonen et al., 2003; Perry et al., 1990).

Other victimized children are more outgoing in their responses: They argue, disrupt bullies' actions, and attempt to return the attack; but even so, they aren't very effective. Instead, they somehow provoke and irritate other children without actually threatening them or giving them the idea that they'll follow through on their hostile displays. Olweus (2001) has termed these children "provocative victims." Not surprisingly, such a child is also physically weak. If he were the school fullback, even bullies would leave him alone (Olweus, 1999, 2001). Some children are both bullies and victims: They are victimized by others, and they themselves act as bullies, often against weaker children.

Victimization takes its toll on children. Those who are victimized are likely to have lower social status and lower self-esteem, to experience more social anxiety, to be lonely, to avoid school, and to show increasing depression over time (Hodges et al., 1997; Juvonen et al., 2003; Smith et al., 1999). Further, in early adulthood, people who as young adolescents have been abused by peers report elevated depression and low self-esteem (Olweus, 1999, 2001).

What factors protect or buffer children from being victimized? Hodges and colleagues (1997) tested the notion that children at risk of being attacked or bullied will be more likely to become victims if they lack friends or are rejected by their peers. Indeed, in these researchers' study, children who were at risk were increasingly less likely to be victimized as their numbers of friends grew. But not just any friend will do; it was children whose friends had characteristics that served a protective function (e.g., physical strength, aggressiveness) who were less likely to be victimized. Moreover, Hodges et al. (1999) found that friendship may not only protect children from victimization but may also increase the likelihood that a target child will maintain self-esteem and will not "invite" attack or submit to it, at least over the year of these researchers' study. Although being victimized by peers can cause a child's social behavior to become less effective, this is less likely to occur when she has a best friend. However, if you lose a best friend and fail to replace him or her by the end of the school year, a child is at increased risk for victimization by peers (Bowker et al., 2006).

Rejection by a peer group is another social risk factor related to increased victimization for children at risk. In other words, the link between each behavioral risk factor (e.g., physical weakness, showing anxiety, low self-confidence) and victimization was greater for peer-rejected children than for better accepted children. These findings support the notion that the expression of an individual's vulnerabilities often depends on social context factors (Hodges et al., 1997). Having friends—the right kind of friends—can serve to buffer the at-risk child from victimization.

ace or Myrtle (Rubin et al., 2006). Few children realize that fashions in names change constantly.

In Western societies, play groups, especially those of young children, tend to be age graded. U.S. children spend most of their time with same-age peers, playing less than a third of the time with children who are more than 2 years older or younger than themselves (Ellis et al., 1981). In contrast, in many other cultures, older children often play with younger ones as well as care for and teach them (Edwards, 1992; Whiting & Edwards, 1988; Zukow-Goldring, 2002).

Across the continents of Africa, Asia, and North America, even young children seem to understand that older and younger peers serve different functions. Typically,

children expect to play with age-mates and younger peers and to get help from older peers (Edwards & Lewis, 1979; Rubin et al., 2006).

The bottom line, however, is that children's typical preference for play with same-age peers does serve a special role in social development. After all, children share interests most closely with those who are at similar points in their cognitive, emotional, social, and physical development (Maccoby, 1998). And it is largely their peers with whom they will be interacting on a continuing basis in their schooling, their work, and their communities.

Consequences of Being Unpopular

To understand the consequences of being rejected by peers, we need to take a closer look at how children actually express their rejection of others. Then we consider the short-term and long-term consequences of being rejected, including the stability of peer status over time.

Children are creative and cruel in the ways they reject the children whom they dislike. Sometimes, children exclude others from their group or activities; sometimes, children bully or dominate others in the classroom. Or children can be sneaky, telling another child that they dislike a third child. In more direct action, children can deny others access to other people or objects; for example, children may not let a preschooler play on a swing or slide. Finally, children can directly attack a disliked peer, either verbally or physically.

Many rejected children, especially those who are not aggressive, tend to be victimized by their classmates. For an exploration of this problem, see Box 12-1 on p. 450.

SHORT- AND LONG-TERM CONSEQUENCES OF REJECTION

Being unpopular can lead to both short-term and long-term problems. Loneliness among children is one of the primary results of being rejected or ignored, and it has many faces (see Table 12-2). Unpopular children have often reported feeling lonely and socially dissatisfied (Asher & Hopmeyer, 1997; Bukowski et al., 2007; Cassidy & Asher, 1992). Research suggests that although neglected children may be no lonelier than average children, rejected children are much more likely than average or neglected children to feel lonely (Asher et al., 1984) (see also Figure 12-5). Being actively disliked by many of one's peers can lead to strong feelings of social isolation and alienation, although non-aggressive rejected children are likely to feel lonelier than aggressive rejected children (Parkhurst & Asher, 1992). Being verbally and physically victimized by peers rather

Table 12-2

Loneliness is not having anyone around

Source: Hayden, Turulli, & Hymel, 1988.

> *Girl, Grade 6*
>
> "Today everybody's going to Mary Ann's party in the group. I'm sort of the one that gets left behind. I'm not invited to the party so I won't do anything on the weekend. Anywhere the whole group goes, I don't."
>
> (Why did that make you feel lonely?) "I'm just the person that gets left back. Maybe they don't realize that I get left, that I'm there, but it happens all the time."
>
> *Boy, Grade 5*
>
> "I was living in Greenvalley. It was a Sunday. All the stores were closed, I had no money. Jason, a friend, had to go to his aunt's. I decided to call on Jamie, but no one was home. I went to turn on the TV and only church stuff was on. I went upstairs to play with my toys, but it was so boring. The dog was behind the couch so I didn't want to bother him. Mom was sleeping. My sister was babysitting. It wasn't my day."
>
> (Why did that make you feel lonely?) "There was no one to talk to or play with, nothing to listen to."
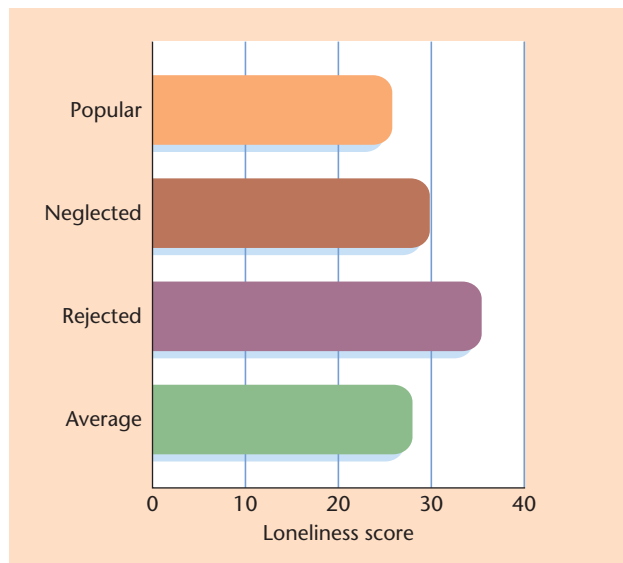
than merely rejected is associated with even greater degrees of loneliness (Kiesner, 2002; Kochenderfer & Ladd, 1996; Ladd 2005).

As social relationships change, feelings of loneliness can change, too. Renshaw and Brown (1993) tracked a group of Australian children in grades three through six for a year and found that those who showed considerable increases in loneliness over time were those who lost friends, became less accepted by peers, and made more remarks about how hard it was for them to make friends. However, even after victimization ceases, children often continue to feel lonely even when they are no longer being harassed by their peers (Kochenderfer-Ladd & Wardrop, 2001). It helps, though, to have at least one friend. Rejected children who have a stable friendship with just one other child may feel less lonely than rejected and totally friendless children (Parker & Asher, 1992; Sanderson & Siegal, 1991).

What are the long-term consequences for a child of being accepted by only a few of his peers? According to Asher and his coworkers (Asher & Paquette, 2003; Parker & Asher, 1987), these consequences are poor achievement, school avoidance, and loneliness. These researchers found that children who were poorly accepted by their peers were less cooperative in the classroom than well-accepted children and were also more likely to drop out of school entirely and to develop patterns of criminal activity. Moreover, chronically victimized children in late elementary school were more depressed at age 23 and at higher risk for being harassed by peers at work or school (Olweus, 2002). Even children who are shy and withdrawn follow a different life-course pattern than less shy children. Shy children were slower than nonshy children in establishing careers, marrying, or becoming parents (Caspi et al., 1988).

CAN PEER STATUS CHANGE?   In a study by Coie and Dodge (1983), both popular and neglected children were fairly stable in their social standing over a 5-year span. Interestingly, though, popular children sometimes lost their high status, and neglected children occasionally gained some social acceptance. In general, however, once a child was rejected, she was more likely than others to maintain this status over a considerable time span. It seems that poor peer relationships in childhood do have implications for later adjustment.

The stability of peer rejection appears to be greater even among kindergartners than the stability of any other category of peer acceptance (Parke et al., 1997). In part, this is the result of **reputational bias**, or the tendency of children to interpret peers' behavior on the basis of past encounters and feelings about these children (Hymel et al., 1990).

reputational bias Children's tendency to interpret peers' behavior on the basis of past encounters with and feelings about them.

When we ask children to judge a negative behavior by a peer whom they earlier liked or disliked, they are likely to excuse the behavior of a peer they earlier liked, giving her the benefit of the doubt, but not to excuse a peer they didn't like. Reputation colors children's interpretations of peers' actions and helps account for the stability of behavior across time (Hymel, 1986).

Reputation, however, is not the only component in peer-status stability. The behavior and characteristics of the children who have experienced rejection are important, too. For example, Coie and colleagues (1990) found that when boys were brought together into new and different social groups (whose members had no knowledge of the boys' earlier reputations), they tended to be assigned the same peer status they'd had before. This was as true of boys who'd been considered popular as of those who'd been rejected (Coie & Kupersmidt, 1983). As we said earlier, although peers' judgments of other children are often bound by relatively superficial and unimportant factors, like physical appearance, it is largely children's social skills that determine their social status. Clearly, we need to find ways to help children with lower status improve these skills and gain greater acceptance among their peers.

PROMOTERS OF PEER ACCEPTANCE: PARENTS AND TEACHERS

The task of increasing peer acceptance among children is huge. We need to help socially isolated or rejected children to gain peer acceptance. We need to reduce the loneliness that results from being less popular than others. We need to encourage children who are "popular" or "average" in social status to be more generous toward their less socially adept peers—to make a greater effort to understand these peers and to find ways of including them in social groups. We may as well ask how we can get people to be more understanding, more accepting, more inclusive of other people, for these issues are hardly limited to the childhood years.

Some believe that early training in social skills may eventually help developing children to find ways to celebrate strengths in one another and offer support for each other's weaknesses. Who is to provide this training? It must rest with parents and teachers, the prime members of Hillary Clinton's (1996) "village," a village that ultimately must encompass all of society.

Parents can draw on a variety of resources in helping their children develop healthy peer relationships (Parke et al., 2002). As Figure 12-6 shows, they start as trusted partners with whom their children can begin to acquire skills of social interaction. Recall from Chapter 6 that secure attachments to parental figures can form the basis for later social competence (Schneider et al., 2001; Sroufe et al., 2005). In addition, researchers have found clear relationships between parents' specific ways of interacting with their children and the children's social behavior with their peers. Parents of well-accepted children interacted in a positive and agreeable manner with their children and were concerned with the child's feelings as well as their own. In contrast, parents of rejected children exhibited more negative and controlling behaviors with their children (Clark & Ladd, 2000; Parke et al., 2004).

In extreme cases, parents who abuse a child often prevent the child from developing healthy peer relationships. For example, Bolger and Patterson (2001) found that preadolescents who were chronically abused were more likely to be rejected by their peers. As Figure 12-7 shows, the more extensive the abuse, the more likely a child was to be rejected by her peers. Moreover, maltreated children, especially if the abuse occurred in the preschool years, had difficulty forming and maintaining friendships. Neglected children were more likely to be social isolates who had infrequent contact with peers (Bolger et al., 1998; Garbarino & Kostelny, 2002). As we saw in Chapter 11, being abused can cause a child to exhibit aggressive behavior with others, and it was the
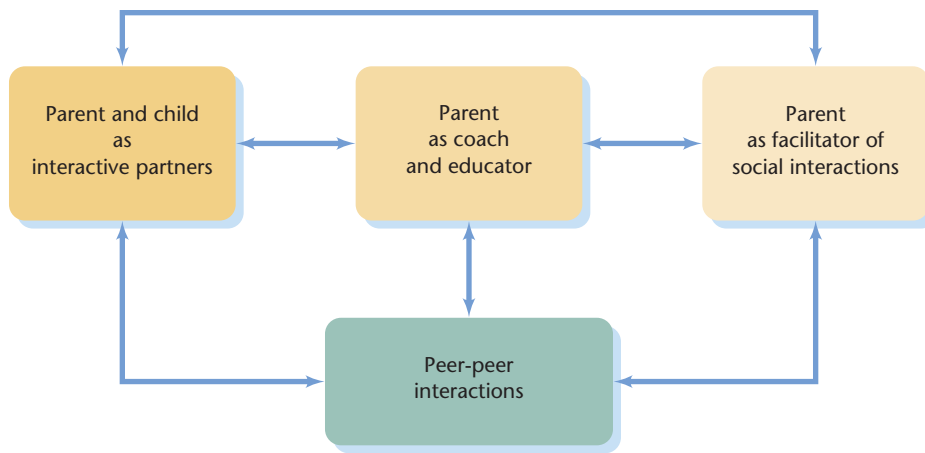
Figure 12-6

How parents help their children develop peer relationships

Children learn social interaction by interacting with their parents, through their parents' coaching and other educational methods, and through their parents' facilitation of opportunities for interaction with peers. The upper, two-way arrows symbolize the reciprocal relationship between parent-child interactive experience (parent as coach) and parents' decisions about opportunities for social interaction; those experiences about ways to further improve their children's peer interaction, and those decisions, affect each other. The lower two-way arrows signal that children's experience in peer interaction provides feedback to parents and children on useful adjustments in social interaction patterns.

elevated levels of aggression that accounted for the links between chronic maltreatment and peer rejection. Other work (Shields et al., 2001) suggests that the inability of many maltreated children to regulate their emotions often leads peers to reject them. Finally, prior abuse in the family also makes it more likely that children, especially boys, will be victimized by their peers (Schwartz et al., 1997) (see Box 12-1).

Parents Are Coaches

Parents can also prepare their children for successful and satisfying social relationships through specific coaching, or teaching (Ladd & Pettit, 2002; Parke et al., 2002). In coaching, parents teach a child a general concept or strategy and give examples of successful behaviors and then guide the child through multiple rehearsals of a particular action. Following that, they review both concept and rehearsal to show the child how to evaluate his own behavior and its result. In this way, parents can advise a child on helpful approaches in interacting with peers, direct him to the most useful strategies, and support him as he tries new ideas.
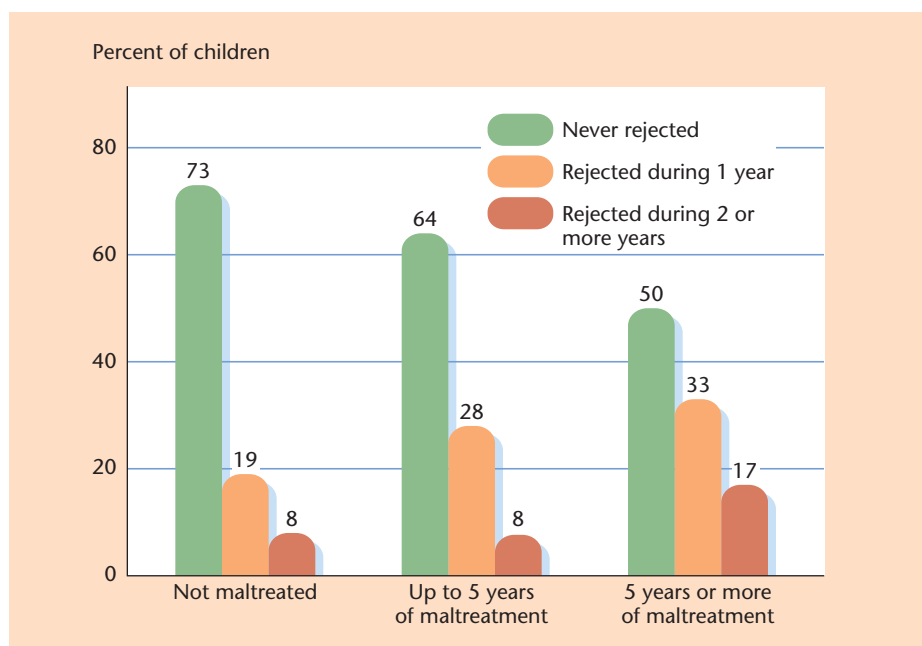
Figure 12-7

Abused children are often rejected

In this study, not only were children who had been abused found to be often rejected by their peers, but the longer the abuse continued, the more likely these children were to be rejected by others.

Of course, this kind of coaching is most helpful when parents themselves are socially adept. In an Australian study (Finnie & Russell, 1988; Russell & Finnie, 1990), researchers found clear differences between the coaching methods mothers of children of high social status and those of children of lower status used when their children were confronted with a peer problem. The former generally used positive approaches (e.g., suggesting that a child propose a third, positive alternative action when he and another child cannot agree) and more rule-oriented strategies (e.g., suggesting that a child propose turn taking instead of fighting over a particular toy). In contrast, the mothers of low-status children tended to suggest avoidance strategies (e.g., that a child ignore unfriendly behavior) or nonspecific tactics (e.g., "just get to know the children"). When they actually joined in the children's activities, the two groups of mothers showed different degrees of skillfulness. For example, the first group encouraged communication among the children generally and actively helped their own children to join in conversation. The second group, however, often took control of a game, disrupted the children's play patterns, or simply avoided supervising the group.

Parents Are Social Arrangers

Another way parents can influence their children's relations with peers is by providing opportunities for interaction with other children (Ladd, 2005; Ladd & Pettit, 2002). The first step in this effort is often finding housing in a neighborhood where children are likely to find suitable playmates and where there are good facilities for children's play. Like many other things that help children grow and develop, a good neighborhood is generally more accessible to families at the higher socioeconomic levels. But even affluent neighborhoods differ. One parent told researchers,

> Just look at this street—kids, swing sets, swimming pools . . . It's a kid's paradise . . . We had a beautiful house (before we moved here from another section of town), but there weren't many kids to play with. (Rubin & Sloman, 1984, p. 384)

Socioeconomic factors can affect friendship patterns in surprising ways. In one study, Medrich (1981) discovered that friendships were more abundant and easy in a low-income neighborhood than in a more affluent one. In the well-to-do California community, friends often lived so far apart that, typically, parents chauffeured their children to preplanned social events. In contrast, in the low-income inner-city neighborhood, where predominantly black families lived, friends were abundant and nearby, and children's play tended to be more spontaneous and frequent. In the first neighborhood, children were selective in their friendships; many had only one or two friends whom they chose because "we have something in common." In the second neighborhood, children typically had four or five close friends and spent considerable time in large groups.

Thus, the physical environment can sometimes counteract other factors in the endeavor to help kids get to know one another. And even in dangerous and unsafe neighborhoods, parents can protect their children by monitoring their activities and their children's choices of peers (Brody et al., 2001; O'Neil et al., 2001; Parke et al., 2008).

Because 2-year-olds aren't too good at finding playmates without their parents' help, being good social arrangers is particularly important for the parents of these very young children. Parents can schedule visits between young friends and enroll their children in organized activities and then, of course, chauffeur their children to and from such visits and gatherings (Ladd & Pettit, 2002). And this effort pays off. Comparing the social activities of children whose parents were good arrangers with those of children whose parents didn't facilitate peer contacts, Gary Ladd and colleagues (Ladd, 2005; Ladd & Golter, 1988) found that the boys in the first group of children had a clear advantage. They had a larger range of playmates and more frequent play companions outside school than boys in the second group. Girls in both groups were equally well accepted by their peers, but peer acceptance for boys was greater for those whose parents initiated peer contacts.

Teachers Can Facilitate Healthy Social Interaction

Teachers can help children who are lonely or socially awkward improve their people skills and increase their acceptance among their peers. We should note, though, that not every child who appears to be unpopular needs intervention. According to Coie and Dodge (1983), many neglected children become more socially competent and accepted over time. And there is nothing intrinsically wrong about solitary play, a common form of play among 2-year-olds, as we saw earlier in this chapter. Often, a child who plays alone simply has a passion for certain kinds of experiences and activities. The time a child spends with Lego sets or paints or the computer may or may not produce the next Frank Lloyd Wright or Picasso or Bill Gates, but in any case, the child may become quite socially competent.

Teachers and parents often act as coaches, encouraging children to include others in their play and helping them to settle disputes.

Studying a group of preschoolers, however, Rubin (1982; Rubin & LeMare, 1990) found that the children who often engaged in simple repetitive activities like banging on the table, whether alone or close to other children, tended to be less socially competent. Similarly, children who engaged in solitary dramatic play (e.g., pretending to be Spider Man all by oneself) were not very socially skilled either. And at greatest risk for later social adjustment problems were rejected children.

Using coaching techniques, Ladd and colleagues (Ladd, 1981, 2005; Mize & Ladd, 1990) were able to improve the social relationships of unpopular third-grade children as well as of neglected and rejected preschoolers. These researchers taught the third graders to use three particular methods of communication: asking positively toned questions, offering useful suggestions, and making supportive statements. (For a sample protocol of a coaching session, see Table 12-3.) Over a 3-week period, children participated in eight sessions, each about an hour long, in which the adult coach offered instruction and guidance through rehearsals, let the children practice on their own, and then reviewed the practice sessions with them. Both immediately after these sessions and 4 weeks later, the researchers' assessments indicated that the children's classroom behavior improved and their popularity increased. A control group, who received no coaching, showed no improvement. A similar intervention with a preschool group achieved comparable results (Mize & Ladd, 1990).

In addition to improving the lonely child's skills and behaviors, Asher and Hopmeyer (2000) suggest changing elements in the child's environment so as to reduce or eliminate conditions that may be hindering her development of good social skills. For example, in a Norwegian study (Olweus, 1993, 2001), researchers persuaded a school to lower its tolerance for bullying and succeeded in altering classroom interactions, such as encouraging teachers to offer public praise to lonely children. These investigators also propose altering class organization patterns: One possibility is to use the homeroom pattern of elementary grades in secondary schools to avoid the constant changing from room to room. Another is "looping," in which one teacher stays with a given class for several years as the classmates move up in grade level.

Interventions of the sort we've described are not undertaken only with young children. Programs have targeted preadolescents who were not well accepted by peers and who were either aggressive or isolated (Bienert & Schneider, 1995). When interventions were tailored to children's specific deficits (i.e., training was designed to reduce either isolation or aggression), both groups of children gained in peer-group acceptance. More recently, prevention programs aimed at both parents and peers have been found to be helpful as well (Conduct Problems Prevention Research Group, 2006). We review these programs in Chapter 14.

Coach: Okay, I have some ideas about what makes a game fun to play with another person. There are a couple of things that are important to do. You should cooperate with the other person. Do you know what cooperation is? Can you tell me in your own words?

Child: Ahh . . . sharing.

Coach: Yes, sharing. Okay, let's say you and I are playing the game you played last time. What was it again?

Child: Drawing a picture.

Coach: Okay, tell me then, what would be an example of sharing when playing the picture-drawing game?

Child: I'd let you use some pens, too.

Coach: Right. You would share the pens with me. That's an example of cooperation. Now let's say you and I are doing the picture-drawing game. Can you also give me an example of what would not be cooperating?

Child: Taking all the pens.

Coach: Would taking all the pens make the game fun to play?

Child: No.

Coach: So you wouldn't take all the pens. Instead, you'd cooperate by sharing them with me. Can you think of some more examples of cooperation? [The coach waited for a response.] Okay, how about taking turns. . . . Let's say you and I [the coach gives examples]. Okay, I'd like you to try out some of these ideas when you play [a particular new game] with [another child]. Let's go and get [the other child], and after you play, I'll talk to you again for a minute or so and you can tell me if these things seem to be good ideas for having fun at a game with someone.

WHEN PEERS BECOME FRIENDS

In our discussions so far, we have focused on how well children may be accepted by their classmates or peer group. Although this group perspective is an important one, children also develop the close, dyadic relationships with a few peers that we call friendships. The essentials of a **friendship**, according to Hartup (1996), are reciprocity and commitment between people who see themselves more or less as equals. As the following exchange indicates, young children don't always find it easy to explain friendship. Here's one child's attempt.

friendship A reciprocal commitment between two people who see themselves more or less as equals.

> **Interviewer:** Why is Caleb your friend?
>
> **Tony:** Because I like him.
>
> **Interviewer:** And why do you like him?
>
> **Tony:** Because he's my friend.
>
> **Interviewer:** And why is he your friend?
>
> **Tony** (with mild disgust)**:** Because—I—choosed—him—for—my—friend. (Rubin, 1980, p. 11)

Expectations and Obligations of Friendship

Children do have certain expectations about relationships with friends (Dunn, 2004; Schneider, 2000). And these expectations about friends seem to change over time in three stages. Note, in the following list, that the expectations that emerge at each stage do not disappear with the next; in fact, those shown in italics tend to increase with age (Bigelow, 1977; Bigelow & LaGaipa, 1975).

1. **Reward-cost stage (Grades 2–3):** Children expect friends to *offer help, share common activities,* provide stimulating ideas, be able to join in organized play, *offer judgments, be physically nearby,* and be demographically similar to them.
2. **Normative stage (Grades 4–5):** Children now expect friends to *accept* and *admire* them, to bring *loyalty and commitment* to a friendship, and to express similar values and attitudes toward rules and sanctions.
3. **Empathic stage (Grades 6–7):** Children begin to expect *genuineness* and the *potential for intimacy* in their friends; they expect friends to understand them and to be willing to engage in **self-disclosure**; they want friends to accept their help, to share *common interests,* and to hold similar attitudes and values across a range of topics (not just rules).

The obligations of friendship change as well. Studying 10- to 17-year-olds, Youniss and his colleagues (Smollar & Youniss, 1982; Youniss, 1980) found that friendship obligations undergo marked shifts over adolescence. Although 80% of the 10- to 11-year-olds thought friends should "be nice to one another and help each other," only 11% of the 16- to 17-year-olds indicated that this was a central obligation. In contrast, 62% of the 16- to 17-year-olds thought that providing emotional support was important, but only 5% of the 10- to 11-year-olds agreed. Reasons change, too. Young children view obligations as important "so he'll be nice to you too" or "to keep the relation going good." Obligations are important to older children because they would benefit the other person ("because she'll be happier if you do") or because they define the relationship ("That's what friends are supposed to do"). Gender is also a factor: Females at all ages are more likely than males to be concerned with emotional assistance and to stress reasons based on benefiting the other person (Ladd, 2005; Schneider, 2000).

Unfortunately, there is no clear evidence that these expectations always translate into action! What children—and many adults—say they expect and what they do are not highly related. Nor are friendships always smooth and everlasting. Fights often occur, friends can and do hurt each other, and friendships do end. Box 12-2 discusses a particularly unhappy kind of relationship in which two people develop mutual antipathy rather than friendship. In the next section, we explore how children make friends and how they behave with their friends.

self-disclosure The honest sharing of information of a very personal nature, often with a focus on problem solving; a central means by which adolescents develop friendships.

Making Friends

Although psychologists and others have studied children's peer relations for many decades, we still find it difficult to answer a simple question: How do children become friends? Gottman and his colleagues (Gottman, 1983; Gottman & Parker, 1986; Parker & Gottman, 1989) tried to provide an answer in a series of studies of children ranging in age from 3 to 7 years old. These researchers set up tape recorders in children's homes and listened while some children played with their best friends and other children played with strangers. The study found that friends communicated more clearly, disclosed themselves more, had more positive exchanges, established common ground more easily, exchanged more information, and were able to resolve conflict more effectively than strangers. Interestingly, unacquainted children who got along well and were rated as likely to become friends scored higher on these dimensions than others in the stranger group.

Studies with other samples of children at varying ages confirm many of these findings. Not surprisingly, children spend more time with friends and express more positive affect in these interactions than they do with nonfriends (Dunn, 2004; Hartup, 1996; Ladd, 2005; Schneider, 2000). They share more with their friends (Jones, 1985), although when friends are tough competitors, sharing with each other may decrease somewhat (Berndt, 1986). Being friends does not mean never disagreeing (Hartup, 1996; Laursen et al., 1996). In fact, friends disagree more than nonfriends, but their conflicts are less heated and they're more likely to stay in contact after an argument

Child Psychology in Action

WHEN "LOVE THY NEIGHBOR" FAILS: PEERS AS MUTUAL ENEMIES

Peer interaction can have a dark side, as studies of peer rejection and bullying reveal. A relationship that clearly partakes of this dark aspect of social behavior is that of **mutual antipathy**—a situation in which two or more children dislike or even hate each other (Parker & Gamm, 2003). Some mutual antipathies involve children of the same gender; others occur between opposite-gender children. What effect do such relationships have on children's social adjustment?

In one study of American third graders, 65% of the children reported at least one same-sex mutual antipathy, and some children had as many as three (Hembree & Vandell, 2000). Such relationships of mutual dislike are found in older children as well. In a study of Dutch children, Abecassis et al. (2002) found that both fifth and eighth graders reported mutual antipathies. In this case, boys were more likely to have these kinds of relationships than girls. And not surprisingly, among children at many ages (third, fifth, and eighth grades), rejected and controversial children were more likely to be involved in these kinds of relationships than were popular and average children. Sadly, mutual antipathies can have very negative effects on both children's and adolescents' developmental outcomes: The more numerous the same-sex antipathies a child is involved in, the poorer his or her socioemotional adjustment and academic performance (Hembree & Vandell, 2000).

During preadolescence, all children with same-sex antipathies are more likely than those without such relationships to be antisocial and to fight and bully or be victimized. In contrast, the effects of mixed-sex antipathies (boy/girl dislikes and is disliked by girl/boy) differ between boys and girls. Boys with these problems tend to be antisocial, but in girls, antisocial behavior does not seem to be linked with mixed-sex antipathies. Instead, girls in mixed-sex antipathies were less socially skilled and less prosocial; they had fewer friends, they were more likely to be victimized, and they reported more somatic and depressive symptoms.

Moreover, having enemies in preadolescence foreshadows later problems during adolescence. Boys who had same-sex mutual antipathies at age 10 were more likely, 3 years later in adolescence, to exhibit addiction and delinquency and to have more somatic complaints and less support from friends (Abecassis et al., 2002). For girls, same-sex antipathies in preadolescence predicted lower achievement scores in adolescence. Cross-gender antipathies in preadolescence were not related to adolescent outcomes for either boys or girls.

Moreover, children hold distorted views of their enemies more than their views of other peers. Ten-year-olds in Estonia attributed more hostility and expected hostile responses when the partner was an enemy than a neutral peer. In other words, the context of a mutual antipathy even modifies our perceptions of another's intent and behavioral strategies (Peet et al., 2007).

Having friends is clearly a protective factor in children's development. Having enemies, on the other hand, puts children at risk for later problems. Just as it isn't good for countries to have enemies, it's not good for children, either. "Love thy neighbor" is clearly a better policy for countries and children alike!

mutual antipathy A relationship of mutual dislike between two people.

than nonfriends (Hartup et al., 1988). Friends are more likely to resolve conflicts in an equitable way and to ensure that the resolution preserves the friendship (Bowker et al., 2006; Hartup, 1996; Laursen et al., 1996). And friends, of course, are more intimate and self-disclosing with each other than with simple acquaintances (Berndt & Perry, 1990; Simpkins & Parke, 2001). Friends are more knowledgeable about each other than nonfriends; they know each other's strengths and secrets as well as their wishes and weaknesses (Dunn, 2004; Ladd, 2005; Schneider, 2000). As someone once said, "A friend is one who knows our faults but doesn't give a damn!"

Friendships Change Over Time

How do friendship patterns change across development? Parker and Gottman (1989) suggest that the goals and central processes involved in successful friendship formation

shift across age. For young children (ages 3 to 7 years), the goal of peer interaction is coordinated play, with all the social processes organized to promote successful play. In the second developmental phase—the 8- to 12-year period—the goal changes from playful interaction to a concern with being accepted by one's same-gender peers. Children are concerned with the norms of the group, figuring out which actions will lead to acceptance and inclusion and which to exclusion and rejection. The most salient social process in middle childhood is **negative gossip**, which involves sharing some negative information about another child. When this works well, the partner responds with interest, more negative gossip, and often feelings of solidarity.

negative gossip Sharing some negative information about another child with a peer.

One study found, for example, that in some schools, girls kept "slam books" in which each girl wrote nasty things about other girls (Giese-Davis, cited by Gottman, 1986). Here is an example of two girls, Erica and Mikaila, gossiping about another girl, Katie.

> **Erica:** Katie does lots of weird things. Like, every time she makes a mistake, she says, "Well, *sorry.*" (Sarcastic tone)
>
> **Mikaila:** I know.
>
> **Erica:** And stuff like that.
>
> **Mikaila:** She's mean. She beat me up once. (Laughs) I could hardly breathe she hit me in the stomach so hard.
>
> **Erica:** She acts like . . .
>
> **Mikaila:** She's the boss. (Gottman, 1986, p. 184)

As we will see in Chapter 14, gossip sometimes expresses hostility. Girls tend to use this kind of relational aggression rather than the forms of physical aggression that boys more commonly use. In the third developmental period (13 to 17 years), the focus shifts to understanding the self. Self-exploration and self-disclosure are the principal social processes this time, and they're accompanied by intense honesty and a lot of problem solving. Table 12-4 summarizes these developmental periods.

Losing Friends

Friendships, like most everything else in life, change over time. Children form new friendships and lose, renew, and replace friendships, sometimes as quickly as within days or weeks, sometimes over a span of years (Bowker et al., 2006; Dunn, 2004). To trace changes in friendship patterns, Parker and Seal (1996) studied 216 children, ages 8

Table 12-4   How friendship patterns develop

	Early Childhood (3–7 years old)	Middle Childhood (8–12 years old)	Adolescence (13–17 years old)
Primary concerns	To maximize excitement, entertainment, and enjoyment through play	To be included by peers; to avoid rejection; to present oneself to others in a positive way	To explore oneself—to come to know oneself, define oneself
Main processes and purposes of communication	To coordinate play; to escalate and deescalate play activity; talking about activities; resolving conflict	To share negative gossip with others	To disclose oneself to another or others; to solve problems
Emotional development	Learning to manage arousal during interaction	Acquiring rules for showing feelings; rejecting sentiment	Getting logic and emotion together; understanding the implications of emotions for relationships

Source: Adapted from Gottman & Mettetal, 1986.

to 15, at a summer camp. Within this larger group, these researchers identified different subgroups based on common patterns in friendships. Some children readily formed new relationships, but their social ties showed little stability. These children were considered playful teasers and were always up on the latest interesting gossip, but they were also aggressive, bossy, and untrustworthy. Other children added new relationships and kept existing ones. These children were neither bossy nor easily pushed around.

Another group of children often broke up friendships but failed to replace these relationships. These children were caring, shared with others, and engaged in playful teasing, yet they were often judged to be "show-offs." Others maintained a stable pool of friendships but added no new ones. The girls in this group were known for honesty, and the group members in general were less apt to tease others; at the same time, they were less caring than others. Finally, some children made no friends at all throughout the summer. These children were perceived by others as timid, shy, and as preferring to play alone. And as we might expect, these children were lonelier than others.

Gender is a factor in the stability of children's peer relationships. Benenson and Christakos (2003) found that girls' closest same-sex friendships appeared more fragile and less lasting than those of boys. Based on their study of 10- to 15-year-olds, these researchers suggest that the tendency of girls to form close relationships with each other in isolation from a larger group may jeopardize these relationships in a way not seen in boys' friendships. Boys' same-sex friendships are more often embedded in a larger group of relationships, which provides a kind of safety net. The easy recourse to third-party mediators, allies, and alternative partners helps keep boys' friendship ties intact.

Although the greater intimacy expressed in girls' friendships may be rewarding, it may also place the friendships at greater risk. Girls may be more likely to worry that a relationship might end or to feel that they've done something to damage a friendship. In girls' friendships, there is more "co-rumination," or excessive discussion of personal problems, than in boys' friendships (Rose, 2002). Moreover higher co-rumination is linked with more depression and anxiety in girls but not in boys (Rose et al., 2007). When things go wrong, girls may intensify the problem by divulging intimate secrets about their partners to others, and this betrayal may hasten the demise of a friendship. Boys, on the other hand, seem to be less intimate with one another, less likely to divulge personal information about their partners, and when problems arise, more likely to confront their partners directly (Rose & Rudolph, 2006).

The Pros and Cons of Friendship

For most children, having friends is a positive accomplishment. As we saw earlier in the chapter, peers and friends provide support, intimacy, and guidance. Children with friends are less lonely and depressed (Asher & Paquette, 2003; Dunn, 2004), and even their long-term outcomes are better. Bagwell and colleagues (1998) found that fifth graders who had a reciprocated best friendship were better adjusted at the age of 23. Compared with friendless children, these individuals experienced less depression, were less likely to exhibit delinquent behavior, did better in college, and had better relationships with family and peers. Having a childhood friendship forecasts more successful adult development.

Not all friendships are beneficial, for they may pose risks as well as offer protective factors (Bagwell, 2004). Even rejected children form friendships, but often, they choose as friends other rejected (and often aggressive) classmates. Moreover, compared with the friendships of nonrejected/nonaggressive children, the friendships of rejected children are often of poorer quality (i.e., they tend to be less satisfying, less intimate, and more likely to be conflict ridden) (Poulin et al., 1999). Rejected children who are friends often encourage each other's deviant behavior, such as cheating, aggression, and substance use or abuse (Bagwell 2004). Thus, it is important to consider the common activities that form the basis of a friendship in addition to the quality of the relationship.

We return to this issue in Chapter 15 when we explore the role of peers and friends in the development of psychological difficulties.

The Romantic Relationship: A Developmental Milestone

Andrew Collins, a student of adolescence, recently observed, "Popular culture is suffused with images of the dreaminess, preoccupation, shyness, self-consciousness and sexual awakening of adolescents in love" (Collins, 2003, p. 2). Many dismiss romantic relationships as no more than flings or even a fiction of popular culture. If they have no developmental significance, why then should we discuss adolescent romantic relationships? Let's examine some of the myths that surround these kinds of relationships and try to separate fact from fancy.

TEENAGE LOVE AFFAIRS REALLY DO MATTER Here are four of the most commonly held mistaken ideas about adolescent romantic relationships.

Myth 1: Adolescent romantic relationships are transitory. According to this belief, these relationships are fleeting and superficial.

Reality: Adolescent romantic relationships are neither uncommon nor transitory. In one study, 25% of 12-year-olds, nearly 50% of 15-year-olds, and 70% of 18-year-olds reported having a romantic relationship within the preceding 18 months (Carver et al., 2003). And a surprising percentage of adolescents in dating relationships reported that their relationships had lasted 11 months or more. Among adolescents 14 and under, 20% reported a similar length of relationship history, and 60% of 17- and 18-year-olds indicated that their romantic ties lasted nearly a year or longer (Carver et al., 2003).

Myth 2: Adolescent romantic relationships are trivial. Even if romantic ties last a fair amount of time, they are of little significance to adolescent development.

Reality: Adolescent romantic alliances are quite significant in adolescent functioning and possibly in longer term outcomes. As we all know, romance has its costs as well as its rewards. Adolescents in romantic relationships report more conflict, have more mood swings, and experience more symptoms of depression (Joyner & Udry, 2000; Larsson & Richards, 1994; Laursen, 1995), especially around a breakup. But there are positive outcomes associated with romantic relationships, too. Being in such a relationship is linked with a feeling of self-worth, a sense of competence, and a feeling that one is part of a **peer-group network** (Connolly et al., 2004; Kirtler et al., 1999).

On the other hand, early dating with a large number of different partners may forecast relationships of poorer quality in young adulthood (Collins, 2003; Collins & Van Dulmen, 2006). Although these studies suggest that quality, timing, and duration of relationships are all possible determinants of the long-term consequences of adolescent romantic ties, one recent report found no link between adolescent romantic involvement and adult adjustment (Roisman et al., 2004). Although the short-term significance of adolescent romance is clear, the verdict on its long-term significance for adult functioning is not yet in.

Romantic ties form earlier than some people believe, as these preteens illustrate.

peer-group network The cluster of peer acquaintances who are familiar with and interact with one another at different times for common play or task-oriented purposes.

Myth 3: Romantic relationships don't differ from other relationships.   According to this myth, these relationships simply mirror relationships with family members, friends, and other peers.

Reality: It is true that the quality of family relationships and same-sex friendships are often predictive of the quality of romantic ties. Conger and colleagues (2000) found that nurturant parenting during adolescence predicted the quality of romantic relationships 5 years later; a close parent-adolescent relationship was linked with a better quality romantic relationship. Neither sibling nor marital relationship quality predicted romantic ties. On the other hand, inadequate parenting (insufficient monitoring of child behavior, inconsistent discipline) is related to increased risk for aggression and violence toward a romantic partner (Capaldi & Clark, 1998; Simons et al., 1998). Clearly, quality of the parent-child relationship is an important predictor of the quality of children's later romantic alliances.

Myth 4: Romantic relationships are important mainly as harbingers of problem behavior.   According to this myth, early dating and especially early sexual activity are linked with a variety of behavior problems, such as drug use and classroom difficulties.

Reality: This is partly true, but mainly teens who date at an early age are likely to develop behavior problems (Davies & Windle, 2000). Delaying dating until it is more normative and until the adolescent is more mature—at 15 or 16—is associated with reduced risk for later problems. Dating many different partners can also increase risk for behavior problems, such as acting-out and aggression. Male and female adolescents who dated many partners between the ages of 12 and 16 showed an increase in behavior problems compared to those who dated fewer people (Zimmer-Gembeck et al., 2001).

CHANGES IN ROMANTIC ALLIANCES OVER TIME   Adolescents at all ages develop romantic ties, but the romantic experience changes between early and late adolescence (Collins, 2002). Just as the frequency of romantic involvement increases across development, the length of time in a specific relationship also increases. Among 14- to 15-year-olds, 35% were in relationships that lasted 11 months or more, whereas 55% of those 16 or older were in long-term relationships (Carver et al., 2003).

The peer group plays a major role in partner choice among young adolescents. You date partners that your peer network approves of or views as "cool." Appearance, clothes, status, and other superficial features guide young adolescents' choices, but older adolescents focus more on characteristics that underlie intimacy and compatibility, such as personality, values, and particular interests (Zani, 1993). Among older adolescents, there is more interdependence between partners in romantic relationships (Laursen & Jensen-Campbell, 1999). Older adolescents are more likely than younger ones to compromise with their partners as a way of solving problems.

In sum, romantic relationships do represent an important developmental milestone in adolescence. Romance is a harbinger of later adaptations; we need to accept and understand its importance to healthy adolescent development.

PARENTS OR PEERS? WHO ARE MOST INFLUENTIAL?

Many writers have seen preadolescence and adolescence as highly stressful periods during which children are buffeted by the often conflicting behavioral standards of parents and contemporaries. Others have argued that these standards conflict far less frequently than is suggested and that, in fact, there is often remarkable agreement between

Authoritative parents who maintain close relationships with their children help them to resist peer pressure more effectively.

parental and peer values (Brown & Huang, 1995; Collins et al., 2000; Vandell, 2001). A better question than whether peers or adults are more influential is: Under what conditions and with what behaviors are peers or adults influential?

Peers and parents each have their own areas of expertise. Although peers are not generally the best advisers on occupational choices, parents are not the best source for the latest and best music recordings and videos. Peers exert more influence on teens' styles of interpersonal behavior, their selections of friends, and their choices of fashions and entertainment. Parents have more impact on their teenagers' academic choices, their job preferences, and their future aspirations (Hartup, 1996). Moreover, when adolescents are with parents and peers, they generally engage in very different types of activities—work and task activities with parents, recreation and conversation with peers (Larson & Richards, 1994; Larson & Verma, 2000).

Much of a child's behavior reflects a mix of peer and parental influence (Elder & Conger, 2000; Ladd, 2005). Studying the use of marijuana, Kandel (1973) found that among teenagers whose best friends were nonusers but whose parents were users, only 17% smoked marijuana. If friends used drugs, however, and parents did not, 56% of adolescents reported using marijuana. When both parents and peers were users, 67% of the adolescents used marijuana. Studies on the use of alcohol, tobacco, and illegal drugs and of early and risky sexual behavior have reported similar numbers (Dishion et al., 2000; Mounts & Steinberg, 1995). Thus, drug usage by parents and peers had a combined impact on adolescents' use of marijuana.

In sum, the beliefs that parental influence is soon replaced by peer influence and that parenting really doesn't matter are very simply wrong. Although parental influence wanes as peer influence increases, both parents and peers play a significant role in determining the child's and adolescent's social development.

BEYOND DYADIC FRIENDSHIPS: THE FORMATION OF GROUPS

As recent American TV reality shows such as *Lost* clearly illustrate, people form alliances and pacts and make other kinds of social connections to overcome obstacles and to reach common goals. In similar fashion, children form alliances and develop group structures with common goals and rules of behavior. Group structures are quite different from dyadic friendships but are another way that children can achieve their social goals.

Groups usually develop a hierarchical structure that identifies and characterizes the relationship of each member of the group to each other member and facilitates member interaction (Hawley, 2007). Inevitably, some group members are identified as dominant, and their leadership roles clearly differ from the roles of the other children in the group.

Dominance Hierarchies

dominance hierarchy An ordering of individuals in a group from most to least dominant; a "pecking order."

Children in a group will form a **dominance hierarchy**, or "pecking order," even in preschool. In fact, Hawley and Little (1999) found clear evidence of a social dominance hierarchy in children aged 1.4 to 3.2 years old. Although preschool children tend to perceive their own positions as a bit higher in the pecking order than they really are, they become increasingly accurate at judging their own status (Hawley, 1999; Hawley, 2007). Moreover, although preschool children's dominance hierarchies are simpler and more loosely differentiated than those of older children, as these children age they tend to agree in identifying group status structures (Hawley, 1999). Other evidence suggests that dominance hierarchies emerge very quickly. In a study by Pettit et al. (1990), within the first 45 minutes of contact, unacquainted first- and third-grade boys began to develop a coherently organized social structure.

What functions do hierarchies serve? First, they reduce aggression among the group members and enable the establishment of nonaggressive means of resolving conflict. For example, a high-ranking member may use a threat gesture to keep a lower ranking group member in line. In fact, aggression is rarely seen in a group with a well-established hierarchy (Hawley & Little, 1999). A second purpose is to help divide the tasks and labor of the group, with worker roles being assumed by the lower status members and leadership roles going to the more dominant members. Third, dominance hierarchies determine the allocation of resources—especially limited resources (Charlesworth, 1988; Hawley, 2007). Rank has as many privileges in the nursery school set as among adolescents (Charlesworth & Dzur, 1987; Savin-Williams, 1987). In a study of adolescent summer campers, Savin-Williams (1987) found that the dominant teens "frequently ate the bigger piece of cake at mealtimes, sat where they wanted to during discussions and slept in the preferred sleeping sites during camp-outs (near the fire)—all scarce resources at summer camp" (p. 934). Clearly, dominance hierarchies play important roles in regulating interaction, but as is often the case, the ones at the top of the hierarchy seem to benefit most.

Cliques and Crowds

clique A voluntary group formed on the basis of friendship.

In middle childhood, children begin to form **cliques**, voluntary groups based on friendship (Schneider, 2000). A clique may range in size from three to nine children, and members usually are of the same gender and same race (Kindermann et al., 1995). By the time children are 11, most of their interaction with peers is in the context of the clique. Membership in cliques enhances children's psychological well-being and their ability to cope with stress (Rubin et al., 2006), just as social acceptance and friendship are buffers against loneliness. Cliques are evident in adolescence as well but decline across the high school years (Shrum & Cheek, 1987), when they are superseded by crowds.

crowd A collection of people whom others have stereotyped on the basis of their perceived shared attitudes or activities—for example, populars or nerds.

A **crowd** is a collection of people who share attitudes or activities that define a particular stereotype—for example, jocks, brains, eggheads, loners, burnouts, druggies, populars, and nerds—and who may or may not spend much time together (Brown & Klute, 2003). Crowd affiliation is assigned by consensus of the peer group; adolescents don't select it themselves (Rubin et al., 2006). The salience of crowds probably peaks in ninth or tenth grade and decreases throughout high school (Brown & Huang, 1995). Those who are in the populars or jocks crowds experience a drop in internalizing problems between childhood and adolescence while the brains, a less popular group,

experience an increase in internalizing problems (Prinstein & La Greca, 2002). Like friendships, peer groups are not always beneficial to participants; for example, as we will see in Chapter 15, gang membership is often linked with delinquency and other negative outcomes. In late adolescence, crowds tend to disband and are replaced by mixed-sex cliques or romantically oriented couples, as we saw in our exploration of romantic ties.

PEER GROUPS IN DIFFERENT CULTURES

Are peers equally important in all cultures or in all parts of one culture? Is America a uniquely peer-oriented culture? Even within cultures, patterns of peer interaction may differ; for example, comparison of urban and rural peers indicates that Israeli children reared in rural kibbutzim are more cooperative and supportive than city-reared children (Schneider, 2000). In the United States, African American children tend to have more friendships as well as more opposite-sex friendships than European American children (Kovacs et al., 1996). Perhaps African American children are socialized to develop larger peer networks or may live in extended family systems that encourage and make feasible broader social ties (Ladd, 2005). For another view of cultural variations among peers, see Box 12-3.

In some countries, peers play a more influential role, but in others, the family and adult agents are more important. Compared with American youth, adolescents in Japan spend less time with peers and more time at home (Rothbaum et al., 2000). In Japan, parental values play a more prominent role than peer values in the formation and structure of adolescent peer groups than in the United States (Rothbaum et al., 2000). Similarly, in Latino cultures, children are more family oriented and less influenced by peers (DeRosier & Kupersmidt, 1991). In Mexico and Central America, parents often maintain this family orientation by directly discouraging peer interaction (Ladd, 2005; Schneider, 2000).

Finally, even styles of relating to peers vary cross-culturally. Research has suggested that Italian children are more likely than Canadian children to embrace debates and disputes with their friends (Casiglia et al., 1998; Schneider et al., 1997). In these studies, Italian children's friendships were seen as stabler than those of Canadian children, and

Some cliques, like this high school Latino group, include members of both sexes.

BOX 12-3
Perspectives on Diversity

CROSS-CULTURAL VARIATIONS IN CHILDREN'S PEER RELATIONSHIPS

Cultures often differ in the way they view the relative importance of the individual or the group. In individual-oriented societies, like Canada, the United States, and many countries of Western Europe, a person's identity is determined largely by personal accomplishments. In contrast, in group-oriented societies, like China and Japan and in Native American tribes, a greater proportion of a person's identity is related to his or her membership in the larger group (Ladd, 2005; Schneider, 2000). Just as adult relationships are shaped by these cultural orientations, so are children's peer relationships.

Studying children in China and Canada, Orlick, Zhou, and Partington (1990) found several differences in the tendencies to be cooperative, to share, to engage in prosocial behavior, to get involved in conflict, and to be aggressive. Among 5-year-olds, 85% of Chinese children were cooperative with one another and more likely to help and share than Canadian children. And 78% of the "individualistic" Canadian children were involved in conflict of one kind or another.

Across these two cultures, the behavioral correlates of peer acceptance showed both similarities and differences. In both China and Canada, middle-school-age children who were sociable and who engaged in prosocial behaviors were accepted by peers, whereas those who were aggressive were often not accepted (Chen & Rubin, 1994). At the same time, Canadian children 7 to 9 years old tended to reject other children who were shy and sensitive, whereas in China, the same characteristics were met with peer acceptance (Chen, Rubin,

& Sun, 1992). Interestingly, however, these perceptions appear to change across development: Among 12-year-old Chinese children, shyness-sensitivity *was* related to peer rejection (Chen & Rubin, 1994). This shift is due in part to changing pressures from Chinese parents for achievement and academic excellence in the 11- to 13-year-old age group, as well as to the expectation that as children grow older, they must become more assertive.

Moreover, historical changes in China are modifying the links between shyness and peer acceptance. Chen et al. (2005) found that shyness was related to peer acceptance for 10-year-olds in a 1990 study; in a 2002 sample of 10-year-olds, shyness was related to peer rejection. Perhaps the changes toward a market economy in China with a focus on assertiveness and self-initiative are responsible for this shift.

Among Chinese Canadian children, those who were competitive in academic tasks were well liked, whereas those who were competitive in physical or athletic activities were disliked (Udvari, Schneider, Labovitz, & Tassi, 1995). In contrast, non-Asian Canadian children who were competitive in athletics were well liked, and among these children, academic competition was unrelated to peer acceptance. These findings highlight the value that Chinese people place on educational attainment (recall our Chapter 10 discussion of cross-national studies of achievement by Stevenson and his colleagues). Clearly, in our efforts to understand peer relationships, we need to recognize the broader cultural contexts in which these relationships develop.

Children in all cultures spend time with peers, but the ways they interact often differ. Chinese children, for example, are more cooperative and less aggressive than U.S. children.

Making the Connections 12

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 12 and discussions in other chapters of this book.

Chapter 12
Expanding the Social World: Peers and Friends

Peer acceptance is related to physical development (e.g., obesity, timing of puberty).
In Chapter 5, "The Child's Growth: Brain, Body, Motor Skills, and Sexual Maturation," p. 165, 173

Parents act as coaches and planners, as suggested by Vygotsky.
In Chapter 8, "Cognitive Development: Piaget and Vygotsky," p. 302

Friendship choice can be linked with drug use and delinquency.
In Chapter 15, "Developmental Psychopathology," p. 561

the investigators suggest that cultural differences in tolerance for conflict may account for this finding. There are even cultural differences in the factors that contribute to the formation of cliques. For example, an adolescent's academic achievement or standing is a stronger determinant of clique membership in China than it is in North America (Chen et al., 2003). In North America, as we saw earlier, a wider range of factors, from academic achievement to athletic prowess to deviant orientation, influences clique membership.

SUMMARY

- Children's interactions with peers are freer and more egalitarian than their interactions with their parents. This greater fluidity facilitates interpersonal exploration and encourages growth in social competence and the development of a sense of social justice.

How Peer Interactions Begin: Developmental Patterns

- During the second half of the first year, infants begin to recognize peers as social partners and attempt to influence one another by such means as vocalizing and touching.
- In the early toddler period, peers begin to exchange both turns and roles during social interactions; in the late toddler period, a major achievement is the ability to share meaning with a social partner. As children's competence with peers develops, they begin to form true **relationships**. They shift toward increased social play and a preference for playing with peers rather than adults, a trend that continues throughout the preschool and elementary years.
- After about age 7, children are more likely to choose same-gender rather than opposite-gender play partners; this remains the case until adolescence, when interest in the opposite gender begins.

How Do Peers Help to Socialize Children?

- The peer group influences the development of the child using many of the same techniques that parents do, such as modeling and reinforcement. Children acquire a wide range of knowledge and a variety of responses by observing and imitating the behaviors of their peers. Imitation may serve as a way to both learn social rules and maintain social interaction.

- Peers reinforce one another with increasing frequency throughout the preschool years, and reinforcement commonly is reciprocated.

- Peers also serve as standards against which children evaluate themselves. Research indicates that the use of **social comparison** with the peer group as a means of self-evaluation increases dramatically in the early elementary school years. Comparing oneself with others forms one building block for one's self-image and self-esteem.

- Peers provide opportunities for socializing and forming relationships as well as for developing a sense of belonging.

Peer Acceptance

- Researchers assess peer status with **sociometric techniques**, in which children identify peers they like and those they don't like. On the basis of these nominations, children have been classified as **popular** (those who receive many positive but few negative nominations), **rejected** (those who receive many negative but few positive nominations), **neglected** (those who receive few nominations in either direction), and **average** (those who have some friends but not as many as the popular group).

- **Controversial** children are liked by many peers but also disliked by many. Rejection occurs for a variety of reasons: **Nonaggressive rejected** children tend to be withdrawn and to lack social skills; **aggressive rejected** children have low self-control and exhibit aggressive and other problem behaviors.

- Popular children engage in more prosocial behavior and help set the norms for a group, whereas rejected children are often aggressive, aversive, and socially unskilled. Neglected children are less talkative and more withdrawn.

- For a child to interact effectively with others, she needs self-confidence, persistence, and the ability to try a new approach when another has been unsuccessful. A model of the cognitive decision-making process describes six steps that children must negotiate in social interaction: Children must evaluate a social situation, assess other children's behavior, decide what their own goals in a situation are and how they may best achieve them, decide on certain actions, and act on their decisions. Children who show social competence and are not overly aggressive use this process most successfully.

- Achieving such competence may be difficult for children who approach social interactions with a focus on their inadequacies and the belief that they cannot change their own abilities and behaviors. In addition, when children attribute the causation of events to factors outside themselves, they may believe they can have no effect on a situation and not try their best.

- In general, children prefer spending time with peers of the same age and the same gender. Although age preferences may be due to the age grading of many institutions in our society, some research suggests that children would choose same-age playmates on their own. Segregation by gender is clearly self-imposed, and it seems to be related to differences in the interests and play patterns of girls and boys. Until the onset of adolescence, opposite-gender friendships are somewhat rare.

- Children often form first impressions of others on the basis of appearance. By age 3, children distinguish attractive from unattractive children in the same way that adults do, and they attribute more negative characteristics to children judged to be unattractive.

- Being unpopular among peers can lead to both short-term and long-term problems. Unpopular children (especially rejected ones) feel lonely and socially dissatisfied, and they are more likely to drop out of school and develop criminal behavior patterns. **Peer victimization** can take a heavy toll on children; having at least one friend can reduce the loneliness this may cause.

- Social standing tends to remain stable across time and situations, showing the most stability for rejected children. Some programs designed to help these children by shaping socially desirable behavior through reinforcement and coaching in social skills have proved beneficial. Although not all unpopular children need help in peer interactions, rejected children clearly can benefit from intervention. Loneliness, a common result of being rejected or ignored, can be lessened if a rejected child has at least one stable friendship.

Promoters of Peer Acceptance: Parents and Teachers

- Parents play an important role in promoting a child's peer relations. They serve as partners with whom the child acquires social skills that help him interact with other children. They also act as coaches or educators by giving advice and support, reinforcing useful behaviors, and modeling strategies for conduct with peers. They provide opportunities for peer interaction through their choice of neighborhood and their willingness to schedule visits with friends (especially for preschoolers). But a child who

is abused by parents may develop aggressive behaviors with peers and thus incur their rejection.

- Teachers can play an important role in helping children improve their social skills. Good results have been gained through coaching children in more effective ways of communicating and in changing conditions of children's environment, such as penalizing bullies and using the home-room pattern at the secondary level.

When Peers Become Friends

- Children develop **friendships** with only a few peers. Expectations of a friend change during the elementary school years from someone who simply shares activities to someone who can also keep secrets and be understanding.

- Studies indicate that friends interact with each other in a way that differs from their interactions with unacquainted peers and that the goals of friendship appear to change with development. For young children (ages 3 to 7), the goal is coordinated play, and for older children (ages 8 to 12), the goal is establishing group norms and being accepted by peers. During this period, **self-disclosure** becomes important. By adolescence (ages 13 to 17), the focus shifts to understanding the self, making self-disclosure a critical component of friendship.

- Although children who are friends often disagree and fight, they tend to communicate more clearly, disclose themselves more, exchange more information, establish more common ground, and become able to resolve conflicts more effectively than strangers. They also share more and express more positive affect toward each other.

- As children become concerned with acceptance into peer groups and figuring out which actions will promote this and which will not, they may engage in **negative gossip** about other children. This may result in more bonding between those who share the gossip.

- Over time, children form new friendships and lose or replace old friendships. A child's personal characteristics may influence her ability to form and keep friendships. A particularly unhappy situation among peers is the formation of **mutual antipathies**, in which two people seriously dislike each other. These relationships can have very negative effects on a child's development and can interfere with both his socioemotional adjustment and his academic performance.

- Romantic involvements are different from family and other relationships and can have positive effects on the adolescent's development. Although the teenager may experience more conflict and more mood swings, she may also gain a sense of competence, heightened self-worth, and a feeling belonging to the peer group.

Parents or Peers? Who Are Most Influential?

- Parents and peers each have their own areas of expertise and influence in children's lives. Peers have more influence in the preadolescent and adolescent years, when they have lot of impact on such things as selection of friends, styles of dress, and choices of entertainment. Parents have greater impact on academic choices and work, on job preferences, and on a child's aspirations for the future.

- Activities such as using drugs and engaging in other risky behaviors are less attractive to teenagers with authoritative parents who are warm and supportive, who encourage their kids in education and grant them psychological autonomy, but who also demand that they conform to rules of behavior. And teens whose friends have parents with these characteristics are further protected from undesirable peer pressure. Adolescents whose parents do not possess these qualities may be particularly susceptible to negative peer influence.

Beyond Dyadic Friendships: The Formation of Groups

- In addition to friendships, children form groups that possess common goals and rules of conduct. Such groups are usually hierarchically organized to identify members' relationships with one another and to facilitate interaction. **Dominance hierarchies** within groups are apparent even among preschoolers, and a "pecking order" appears to develop within a short time after the first contact.

- Within groups of children, hierarchies serve the purposes of resolving conflict, dividing tasks, and allocating resources. A child's position in a hierarchy will affect the degree to which other children associate with her and imitate her.

- In middle childhood, children may form **cliques**, which enhance their well-being and ability to cope with stress. Later, children may be assigned by their peers to **crowds**, whose salience decreases by the end of high school.

Peer Groups in Different Cultures

- Within and between cultures, patterns of peer interaction differ. Varying socialization concepts

and practices give peers more or less influence on children. In Mexico and in Central American countries, for example, family influences remain strong throughout adolescence. Latino parents often directly discourage peer interaction.

EXPLORE AND DISCUSS

1. Are the same characteristics likely to make a child popular or rejected in all cultures? Support your answer with examples.

2. Girls' and boys' friendships differ in a number of ways, but they also share some common characteristics. Discuss and differentiate the genders' friendship patterns and try to explain the reasons for their differences.

3. Romantic relationships are often a mixed blessing. What do you think are the positive and negative effects of romantic relationships on adolescent development?

Berthe Morisot (1841–1895). *The Children of M. Gabriel Thomas*, 1894. Musee d'Orsay, Paris.

13.

Gender Roles and Gender Differences

In most societies, men and women behave differently, are viewed and treated differently by others, and play distinct roles. At the same time, there are many situations in which males and females behave alike, receive equal treatment from others, and play similar roles. The challenge for psychologists is to determine how these differences and similarities originate in the developing child and to articulate the processes that contribute to gender-specific patterns of behavior.

Five primary theories, most of them discussed in Chapter 1, have been used to explain these patterns. First, in his psychoanalytic theory, Freud proposed that the child, through a process of **identification**, acquired either feminine or masculine traits and behaviors by identifying with the same-sex parent. Freud noted that children's developing curiosity about their own bodies, around the ages of 5 or 6, alerts them to the differences in sexual anatomy between males and females. This observation formed the basis for his proposal that this period was critical to the formation of gender identity. Second, cognitive social learning theory suggested that children acquire gender identification both through parents' direct guidance and encouragement and by imitating parents and other people. According to this view, children understand gender quite early, and the fact that parents behave differently toward their male and female babies from the moment of birth may be influential in this understanding. Third, gender-schema theory, an information-processing approach, proposed that children as young as 2.5 begin to develop their own naive theories about gender differences and gender-appropriate behaviors. Fourth, in his cognitive developmental theory, Lawrence Kohlberg asserted that children categorize themselves as female or male on the basis of physical and behavioral clues and then proceed to behave in what they understand to be gender-appropriate ways. According to Kohlberg, it's not until children are about 6 or 7 that they make stable gender-typed choices. Finally, evolutionary approaches to psychology stressed the principles of natural selection and adaptation.

identification The Freudian notion that children acquire gender identity by identifying with and imitating their same-sex parents.

gender typing The process by which children acquire the values, motives, and behaviors considered appropriate for their gender in their particular culture.

gender-based beliefs Ideas and expectations about what is appropriate behavior for males and females.

gender stereotypes Beliefs that members of a culture hold about how females and males should behave; that is, what behaviors are acceptable and appropriate for each sex.

gender roles Composites of the behaviors actually exhibited by a typical male or female in a given culture; the reflection of a gender stereotype in everyday life.

gender identity The perception of oneself as either masculine or feminine.

gender-role preference The desire to possess certain gender-typed characteristics.

sexual preferences The preference for same or opposite gender sexual partners.

These concepts were applied to gender-related behaviors, especially behaviors that increase the likelihood that a person's genes will be passed across generations (Buss, 2003, 2007; Geary, 2006). To be able to pass genes from one generation to the next, individuals need to have mating strategies that enhance their reproductive success. According to Buss (2000), males and females use different strategies to achieve reproductive success. Males have developed aggressive and competitive skills to compete successfully with other males in attracting mates. Females have developed strategies for attracting and keeping males who are able to provide resources, including protection, for their offspring. These two sets of strategies complement each other and have led to the evolution of gender differences in both animals and humans. Other biological factors also contribute to differences in female and male attitudes and behaviors, such as specific hormones and levels of those hormones, as well as male-female differences in brain lateralization. As we've stressed throughout this book, most human characteristics are products of the interplay between genetic and environmental forces, and gender behavior is no exception.

We begin this chapter by examining some standards of male and female behavior common to American culture and take a brief look at some quite different cross-cultural behaviors. We then consider some actual patterns of gender differences and how stable these patterns are over the life course. We then turn to the issue of biological influences in gender behavior. Next we explore cognitive factors. Then we consider the influences on gender behavior of parental teaching, reinforcement, and modeling and of the social forces represented by peer groups, schools, and the media. Next we examine children's development of sexual orientation and preference for same- or opposite-gender individuals. We conclude with a brief look at androgyny, the quality of possessing within oneself both masculine and feminine psychological characteristics.

DEFINING SEX AND GENDER

Traditionally, the word *gender* has been used to refer to cognitive and social differences between males and females, and *sex* refers to biological and physiological differences, but it is often difficult to separate these issues. For this reason, we use the terms interchangeably, except when we are discussing primary or secondary sex characteristics or sexual behavior.

The process by which children acquire the values, motives, and behaviors viewed as appropriate for males or females, referred to as **gender typing**, is a multidimensional concept (Ruble, Martin, & Berenbaum, 2006). Children begin by developing **gender-based beliefs** about what behaviors are appropriate. These beliefs are derived largely from **gender stereotypes**, which are the beliefs that members of an entire culture hold about the attitudes and behaviors acceptable and appropriate for each sex. These stereotypes prescribe the way males and females should be and should act. **Gender roles** are composites of the distinctive behaviors that males and females in a culture actually exhibit and thus are essentially the reflections of a culture's gender stereotypes. Early in life, children develop a **gender identity**, or a perception of themselves as either masculine or feminine and as having the characteristics and interests that are appropriate to their gender. And children develop **gender-role preferences**, or desires to possess certain gender-typed characteristics. Children's choices of toys and of play partners reflect these preferences. Finally, in late childhood or adolescence, children develop **sexual preferences** and are attracted to same- or opposite-gender individuals.

GENDER-ROLE STANDARDS AND STEREOTYPES

When children are still young infants, parents and other agents of socialization attempt to teach them standards for behavior that are gender based and to shape different behav-

Despite the changes that have occurred in recent years in men's and women's roles in society, gender-stereotypical roles are still widespread. In Japan, some women continue to teach their daughters to perform the formal and highly ritualized tea ceremony, and in the Philippines, some men train their sons in traditional male skills. Here, a young boy learns the blacksmith trade.

iors in boys and in girls (Maccoby, 1998). In fact, this process starts immediately after a baby's birth, when parents give the baby a name and bring the infant home to a nursery often decorated in gender-typed ways—flowered bumper pads and pale, beribboned lampshades or bright-colored curtains with sports or outer space themes. Parents dress male and female children in distinctive clothes, style their hair in different ways, select toys and activities for them that they deem gender appropriate, promote children's association with same-gender playmates, and often react negatively when children behave in ways they consider gender inappropriate.

Cultures are internally quite consistent with regard to their standards of "appropriate" gender-role behavior. We do not use the term *appropriate* to mean "desirable"; we mean what people in general think is appropriate—what is typical and generally accepted. In American society, the male role is seen, stereotypically, as charged with controlling and manipulating the environment. Men are expected to be independent, assertive, dominant, and competitive in social and sexual relations. The female role is seen as emotionally supporting the family. Women are expected to be relatively passive, loving, sensitive, and supportive in family and social relationships. In general, people regard the expression of warmth in personal relationships, the display of anxiety under pressure, and the suppression of overt aggression and sexuality as more appropriate for women than for men (Ruble et al., 2006). Despite the concern with gender equality initiated by the Woman's Movement, change in stereotypes has been slow. Males have become less likely to endorse personality traits such as toughness and aggression (Spence & Buckner, 2000). However, the world of work remains stereotypically gendered (Liben & Bigler, 2002). Both children and adults still tend to think of mechanics and doctors as male and librarians and nurses as female. These stereotypical roles are widespread not only in North American culture but in a wide range of societies from Middle and South America, Europe, Africa, Asia, and Oceania (Wade & Tavris, 1999; Williams & Best, 1990). However, there are variations among countries, with more tradition-bound cultures such as Middle Eastern nations (Saudi Arabia, Iraq) and some Asian societies (Taiwan) adhering to more rigid stereotypes for the two genders. In one study, for example, 8- to 10-year-old Taiwanese children were more committed to maintaining gender-role stereotypes than were more Westernized Israeli children (Lobel et al., 2001).

Within the United States, the strength of these standards also varies with ethnicity. African American families are more likely to socialize children without strict boy-girl gender-role distinctions, and the children are less likely to hold stereotypic views about women (Leaper et al., 1999). These families value early independence for both boys and girls, and they make fewer gender distinctions in deciding who is to carry out which family roles and tasks (Gibbs, 1989). They encourage girls to be aggressive and assertive and boys to express emotion and nurturance (Allen & Majidi-Abi, 1989; Basow,

1992). Among Mexican Americans, gender-role socialization standards for boys and girls are much more clearly differentiated (Coltrane & Adams, 2008).

Age affects gender-role expectations as well. Young children between 3 and 6 years old are especially rigid in their gender stereotyping (Ruble et al., 2006). As they develop, they become more flexible in their attitudes about a variety of concepts, including gender issues (Blakemore, 2003).

Education also affects gender-role standards and stereotypes (Ruble et al., 2006). College-educated women are more likely than less educated females to perceive the feminine role as involving independence and desire for achievement. This difference trickles down to their children. Boys and girls whose mothers are employed in skilled occupations and professions are more likely than children whose mothers are full-time homemakers to think that acquiring an education and having a profession are appropriate for women and that it's also all right for men to assume housekeeping and child-care tasks. At the same time, researchers have found that even educated men maintain more stereotyped gender-role standards than do women.

Adult men and women also differ in their views of gender typing in children. It is common to find fathers more concerned than mothers that their children maintain behaviors appropriate to their gender (Ruble et al., 2006). However, in spite of some variations in gender-role standards, almost all Americans, regardless of gender, age, and education, still view aggression as more characteristic of men and view interpersonal sensitivity as more common in women (Dodge et al., 2006).

GENDER DIFFERENCES IN DEVELOPMENT

How accurately do gender stereotypes reflect differences in the actual behaviors of males and females? As Table 13-1 shows, although clear gender differences have been found in some characteristics, others have been found only occasionally, and still others have never been observed. As you examine the table in detail, keep in mind that even for the differences that have been observed consistently, the characteristics of males and females overlap. Some males are more compliant, verbal, and interested in the arts than some females. Some women are stronger than the average male.

Developmental Patterns of Gender Typing

Children develop gender-typed behavior patterns at an early age (Ruble et al., 2006). Even before they can tell us about their gender-based preferences, infants and toddlers clearly express their choices through their looking behavior. Using techniques that we described in Chapter 4, Lisa Serbin and her colleagues (2001) found that from a very early age, boys and girls differ in their preferences for dolls and cars. As Figure 13-1 shows, by the time they were a year old, girls had begun to show a greater preference for dolls than boys did, and this gender difference was even stronger by the time the children were 1.5 to 2 years old. In contrast, boys showed much stronger preferences for vehicles such as cars and trucks than girls did by the ages of 1.5 and 2. In a study of 1- to 3-year-olds in a day-care center, boys and girls expressed their preferences for gender-appropriate toys (O'Brien et al., 1983). However, girls more often than boys also played with gender-inappropriate toys. Why do you suppose girls are more likely to play with a truck than boys are to cuddle a doll? Let's look at some reasons.

Western culture is basically male oriented, and the masculine role is associated with greater esteem, more privileges, and higher status. The male role is more clearly defined, and there is greater pressure for boys than for girls to conform to narrow, gender-appropriate standards. Boys are also more likely to be "systematizers," who focus on trying to understand and organize a specific domain (e.g., cars) than girls, who are less focused on a particular set of interests (Baron-Cohen, 2003). In addition, boys are more likely to

Table 13-1 Gender differences: Real or myth?

Some gender differences are real . . .

Physical, Motor, and Sensory Development

At birth, girls are physically and neurologically more advanced. They walk earlier, and they attain puberty earlier. Boys have more mature muscular development and larger lungs and heart, and at birth, they are less sensitive to pain. With increasing age, boys become superior at activities involving strength and gross motor skills. On the other hand, male fetuses are more likely to be miscarried, boys have a higher rate of infant mortality, and boys are more vulnerable to malnutrition, disease, and many hereditary anomalies. In terms of physiological vulnerability, females are clearly not the weaker sex.

Cognitive Development

From infancy through the early school years, girls display superior verbal abilities, including vocabulary acquisition, reading comprehension, and verbal creativity. From about age 10, boys display greater visual-spatial ability, which is involved in such tasks as reading maps, aiming at a target, and manipulating objects in two- or three-dimensional space. Beginning at about age 12, boys excel in some kinds of mathematics, especially geometry.

Social and Emotional Development

Even in early social play, boys are more often the aggressors and the victims of aggression, particularly physical aggression. Girls tend to use more indirect forms of aggression, such as excluding another child from social interaction. As early as age 2, girls are more likely to comply with the demands of parents and other adults. Boys are more variable in their responses to adult direction. Gender differences in compliance with peers are not consistent, but preschool boys are less likely to comply with girls' demands than with those of other boys, and they are also less likely than girls to comply with partners of either gender. Girls are more nurturant toward younger children.

Atypical Development

Boys are more likely to have genetic defects, physical disabilities, mental retardation, reading disabilities, speech defects, and school and emotional problems.

Some are found only sometimes . . .

Activity Level

Many studies find no gender differences in activity level. When they do find differences, it is usually boys who are more active than girls.

Dependence

Younger children do not display gender differences in dependence. Older girls and women tend to rate themselves as more dependent, but this is probably changing.

Fear, Timidity, and Anxiety

Again, young children do not exhibit consistent gender differences in timidity. Older girls and women report themselves as being more fearful, and males are more likely to involve themselves in physically risky recreations and occupations. On the other hand, many women today are in dangerous occupations (e.g., firefighting, high-steel construction) and enjoy risky sports (e.g., mountain climbing, hang gliding).

Exploratory Activity

Studies do not find consistent gender differences in exploratory activity. A number of studies of early exploratory activity have found boys to be more venturesome and curious and more likely to attack barriers intervening between themselves and a desirable object.

Vulnerability to Stress

Findings over the last decade suggest that males may be more vulnerable to family disharmony and interpersonal stress, as evidenced by an overrepresentation of boys in child guidance clinics. However, we need further research to draw firm conclusions.

Orientation to Social Stimuli

Some evidence indicates that infant girls may orient to faces more than boys and may recognize their mothers' faces at an earlier age.

(Continued)

Table 13-1   (*Continued*)

Others are myths . . .
Sociability
Boys and girls are equally social; they spend as much time with others and are equally responsive to others. There's no gender difference in the need for love and attachment. Males and females are equally capable of nurturance, although girls and women do more actual caring for children, relatives, and friends.
Suggestibility and Conformity
Girls and boys do not differ in suggestibility or in the tendency to conform to the standards of a peer group or to imitate the responses of others.
Learning Style
Boys and girls are equally good at rote learning and simple repetitive tasks. They also display similar skills in tasks involving the inhibition of previously learned responses and in complex cognitive tasks. Girls and boys are equally responsive to visual and auditory stimuli.
Achievement
Girls and boys generally display equal levels of achievement motivation. Under neutral conditions, girls are often more achievement oriented than boys, but in a competitive situation, boys are more likely than girls to exhibit enhanced achievement motivation.
Self-Esteem
Boys and girls do not differ in self-esteem. However, girls rate themselves as more competent in social skills, and boys view themselves as stronger and more powerful.
Verbal Aggressiveness and Hostility
Girls and boys engage equally in verbal aggression but use different approaches: Girls tend to gossip and exclude others; boys are more directly verbally assaultive.

Sources: Dodge et al., 2006; Halpern, 2004; Halpern et al., 2007; Hyde, 2005; Hyde & Linn, 1988; Hyde & Plant, 1995; Leaper & Friedman, 2007; Maccoby, 1998; Maccoby & Jacklin, 1974; Ruble et al., 2006; Underwood, 2003, 2004; Wigfield et al., 2006.

Figure 13-1

Toddlers prefer to look at gender-appropriate toys

By 18 months, boys and girls prefer to look at gender-reflective toys. Boys prefer looking at vehicles and girls prefer to look at dolls.

Source: Serbin et al., 2001.
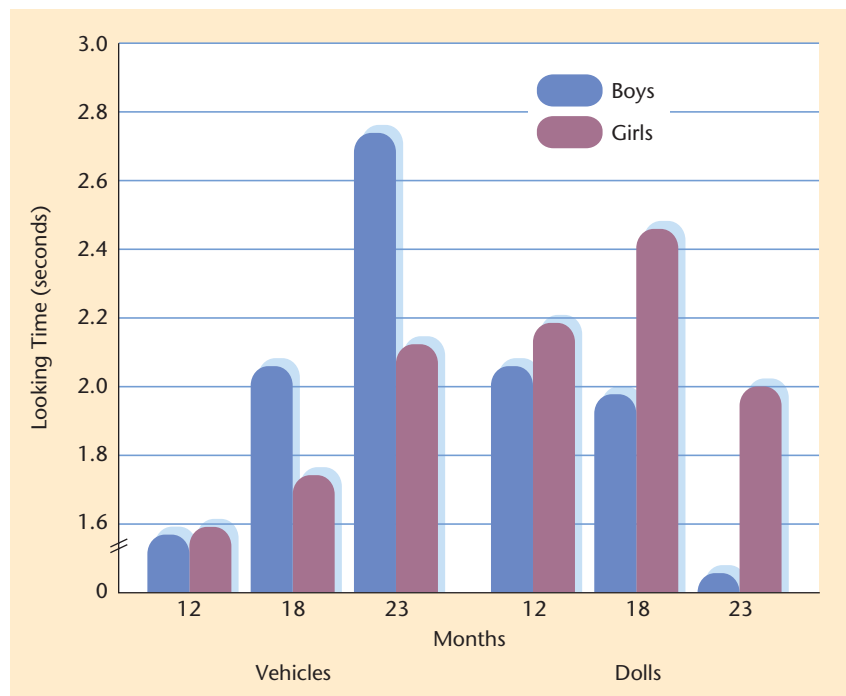
develop "extremely intense interests" in some objects and activities than are girls, and these passionate interests of boys are often gender stereotyped (e.g., vehicles, machines, trains) (Deloache et al., 2007). Moreover, boys' preferences for gender-stereotyped toys remained consistent across age (5 to 13), whereas girls' interest in play with gender-stereotyped toys decreased as the girls grew older (Cherney & London, 2006).

Although the situation is changing, boys shy away from things that are "for girls," fearing derision from other boys, whereas girls may want to do things that are regarded as higher status. Parents and peers condemn boys for acting like sissies—crying, retreating in the face of aggression, wearing feminine apparel, or playing with dolls. In contrast, they tend to accept a girl's occasional temper tantrums, rough-and-tumble play, wearing of jeans, or playing with trucks. In fact, one survey found that more than 50% of women and girls described themselves as being or having been tomboys, participating in sports, and playing with "boys'" toys at some point during childhood (Morgan, 1998).

Although as we have said, many girls engage in masculine activities, boys and girls do develop distinctive patterns of interest that are consistent with gender stereotypes. In a national survey of more than 2,000 children between the ages of 7 and 11, Zill (1986) found that boys liked guns, boxing, wrestling, karate, team sports, and fixing and making things more than girls did. In contrast, girls enjoyed dolls, sewing, cooking, dancing, and looking after younger children more than boys did. More recent studies of girls in middle childhood and adolescence have found that girls spent more time in feminine leisure activities (dance, handicrafts, art, writing stories and letters) than in masculine activities (competitive sports, hunting, fishing, building) (McHale et al., 2004). Parents and others encourage these patterns of interest in a variety of ways, including assigning household tasks. Even in the twenty-first century, girls are more likely to make beds, clean, prepare meals, wash dishes, and do laundry. Boys are more likely to fix things, take out the garbage, and mow lawns (Coltrane & Adams, 2008). As we will see, a variety of theoretical perspectives can help account for these findings. Unfortunately, as Box 13-1 suggests, parents and others in society also differentially encourage and discourage certain academic interests in boys and girls, which may be detrimental to both in the long run.

Stability of Gender Typing

Although children develop masculine and feminine interests and behaviors early, as we have noted, many girls participate in both female and male pursuits during childhood. With the onset of puberty, however, there is a movement back toward strict gender typing (Larson & Richards, 1994; McHale et al., 2004). In one study, girls who claimed to be tomboys indicated that at about age 12, they began to adopt more traditionally feminine interests and behaviors owing to pressures from both parents and peers and to their own increasing interest in romantic relationships (Burn et al., 1996) (see also Chapter 12).

In spite of these developmental fluctuations in gender typing, individual children who are strongly masculine or feminine during childhood tend to be more masculine or feminine during adulthood (Kagan & Moss, 1962). Boys who were interested in competitive games, activities that required gross motor skills, and such things as mechanics, and girls who were interested in cooking, sewing, reading, and noncompetitive games were involved in similar gender-typed activities in adulthood. The stability of gender-typed characteristics was related to cultural acceptance, however. When a characteristic was consistent with gender-role standards, it led in adulthood to similar behavior; for example, a girl who was very dependent on others in childhood might become a secretary. But when a characteristic was incongruent with cultural standards, it tended not to remain stable from childhood to maturity; a boy who was dependent on others in childhood might become an entrepreneur.

During adulthood, most people's masculine or feminine behavior remains stable. In one longitudinal study, researchers found that 54% of adults continued to be rated similarly by observers over a 10-year period in terms of masculinity and femininity

BOX 13-1

Child Psychology in Action

WILL WE LET COMPUTERS WIDEN THE GENDER GAP?

Computers are commonplace in classrooms, but are boys and girls benefiting equally from the technological revolution? Studying many types of computer activities available to children, including home use of a computer and in courses at school, after-school clubs, and summer camps, Mark Lepper (1985; Lepper & Gurtner, 1989) found large gender differences in girls' and boys' use of these opportunities. In formal computer classes, there were as many as 5 to 10 boys for every girl, and this difference in participation rates increased as activities became more costly and more effortful. In California schools, boys outnumbered girls in introductory computer programming classes by a 2:1 ratio, but in advanced programming classes, the ratio was as high as 10 to 15 boys for each girl.

What might be the reasons for this gender gap? The computer field—like the fields of math and science—has long been dominated by males, in large part because of the myth that males are more capable than females in technical subjects. Thus, the computer science field has few female role models. Computer labs in schools are often competitive, noisy, and high-activity environments in which boys may feel more comfortable than girls. Many girls view computing as a socially isolated activity and find the negative stereotypes of computer users as unflattering and unfeminine (Schott & Selwyn, 2000). In fact, sixth and eighth graders depicted computer users as male and wearing glasses, consistent with the prominent stereotypes of the male computer nerd (Mercier, Barron, & O'Conner, 2006).

The kinds of software often used to introduce students to computers also seem to have been written for boys (Subrahmanyam, Greenfield, Kraut, & Gross, 2001). Among computer games, the most common themes are war and violence and male-gender-typed sports such as football. Even the titles of specifically educational games may turn girls off: Alien Addition, Demolition Division, Spelling Baseball. It's not surprising, therefore, to find that boys play electronic games more often than girls and that they tend to make more gender distinctions about the acceptability of these games for either boys or girls (Cherney & London, 2006). According to Funk and Buchman (1996), although most fourth and fifth graders thought both girls and boys could play video games, boys were considerably more likely than girls to say that playing video games was not an acceptable activity for girls. Boys clearly spent more time at such games, and they were a good deal more likely than girls to describe video game playing as their favorite activity. A number of boys also said that girls who spent a lot of time playing video games were not popular and that, if girls wanted to be popular, they should not play such games, especially "the fighting games." Few girls agreed with these statements; as many as a third held that fighting games were okay for girls. This result is consistent with research that suggests females are more flexible than males in their attitudes toward gender roles.

Despite the fact that computers have many varied uses, including word processing and graphic design, schools often present computers as mathematical tools. Computer labs are often found in the math department, and math teachers supervise their use. In addition, credits for computer courses often count toward math requirements. Inasmuch as girls have long been brainwashed into believing that they can't do math as well as boys, this arrangement both keeps girls away from computers and reinforces the myth. The ultimate result is to turn girls ever further away from careers in math and science (Shea, Lubinski, & Benbow, 2001). However, according to recent trends, the gender gap in computer use may be closing, partly because of the expanding range of applications that are available, including e-mails, chat rooms, and educational pursuits—not just games.

Recent data suggest that girls and boys report equal levels of computer usage and are equally confident in their computer skills. But they still differ in the type of usage they favor; for example, girls often use computers for social contact, whereas boys use them to play games (Subrahmanyam et al., 2001).

expressive characteristics Presumably typical of females, these characteristics include nurturance and concern with feelings.

(Hyde et al., 1991). However, gender roles may shift as adults meet the demands of new situations and circumstances. One of the most important transitions is parenthood. Even among egalitarian couples committed to equal sharing of household tasks, the onset of parenthood generally heralds a return to traditional gender roles (Cowan & Cowan, 2000; Parke, 2002). In these roles, women exhibit more **expressive characteristics**—they are more nurturing, concerned with feelings, empathic, and child oriented.
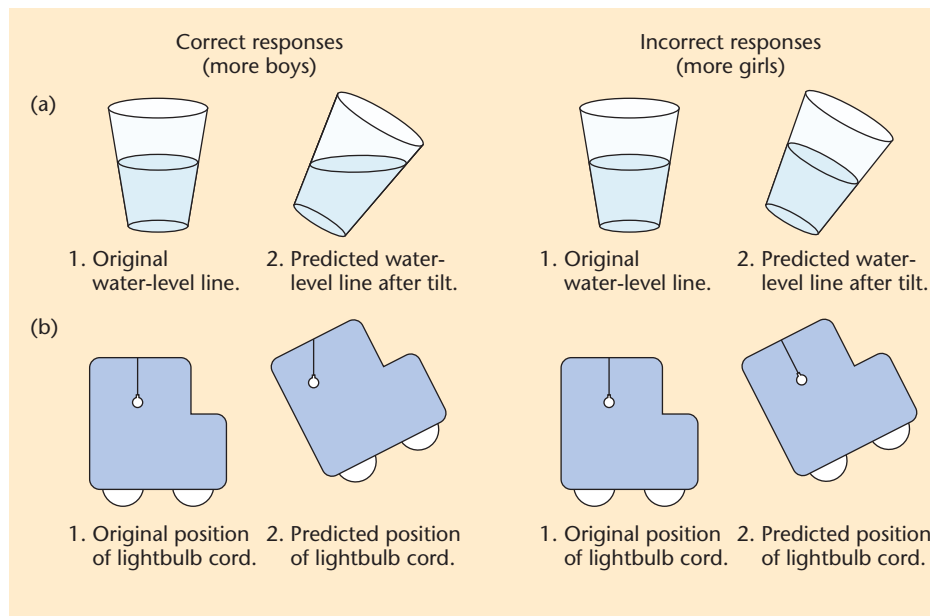
Boys' and girls' understandings of horizontal and vertical relations

Between the ages of about 8 or 9 to about 16 or 17, boys tend to make correct predictions of changes in horizontals and verticals following tilt, whereas girls are more likely to predict the results incorrectly. In general, boys seem to be more skilled at visual-spatial tasks.

Source: Liben & Golbeck, 1980.

Men exhibit more **instrumental characteristics**—they are more task and occupation oriented. Men tend to become more expressive and nurturing in old age, though. Women tend to become more autonomous as they get older but return to a more feminine gender-role orientation in old age, perhaps because they become less self-sufficient and have a greater need for help (Hyde et al., 1991; Maccoby, 1998).

instrumental characteristics Presumably typical of males, these characteristics include task and occupation orientation.

Gender Differences in Abilities

There are modest gender differences in abilities but also many similarities (Hyde, 2005). Boys tend to be more skilled than girls at manipulating objects, constructing three-dimensional forms, and mentally manipulating complex figures and pictures (Choi & Silverman, 2003). In grades three to eleven, boys are more likely than girls to make correct judgments of spatial relations, as Figure 13-2 illustrates (Liben, 1991). However, this is not always the case: Few gender differences in spatial abilities are found among children in poor families, which suggests that these differences are at least to some extent determined by environmental opportunities (Bower, 2005). Male superiority in math is generally restricted to performance in geometry, a form of mathematics that requires spatial visualization skills (Hyde, 2005). In fact, girls do better in computational skills than boys, and there are no gender differences in girls' and boys' performance on tests of basic math knowledge or algebra, which are less reliant on spatial ability than geometry (Halpern, 2004; Hyde et al., 1990). Moreover, boys' math superiority only surfaces in the high school years, probably because of the lower expectations of teachers and parents for girls' math skills (Hyde, 2005). Girls tend to speak and write earlier and to be better at grammar and spelling than boys (Halpern, 2000). Boys are more likely to suffer from social and communicative difficulties; autism is four times more frequent in boys than in girls (Baron-Cohen, 2003).

BIOLOGICAL FACTORS IN GENDER DIFFERENCES

These differences between males and females are to some extent rooted in biology. Research on the influence of biological factors on gender differences has focused on

hormonal function and brain lateralization. Refer back to Chapter 5 if you need to refresh your understanding of these concepts.

Hormones and Social Behavior

Hormones are powerful and highly specialized chemical substances produced by the cells of certain body organs and have a regulatory effect on the activities of certain other organs. Those hormones associated with sexual characteristics and with reproductive functions are present in differing concentrations in males and females from infancy through adulthood. Among male hormones, called androgens, testosterone is the principal and most potent one. Women's principal hormones are various forms of estrogen and progesterone. However, each sex also has small amounts of the other's hormones: Women have a little testosterone, and men have some estrogen and progesterone. The differences in the concentrations of these hormones are not great in boys and girls of preschool and elementary school age, but they become quite pronounced after puberty.

Both the prenatal and the pubertal periods are critical in terms of the effect of hormonal action on development (Hines, 2004). In the prenatal period, fetal testosterone is the major determinant of the anatomic sex of the fetus, and hormones organize the fetus's biological and psychological predispositions to be masculine or feminine. The surge in hormones during puberty activates these early predispositions.

The effects of hormones have been demonstrated in animal studies. When pregnant monkeys were injected with testosterone, their offspring were females that exhibited masculine behaviors such as threatening gestures and rough-and-tumble play (Young et al., 1967). When male hormones were injected into female monkeys after birth, they also become more assertive, sometimes even attaining prime dominance status in their monkey troop (Wallen, 1996). In human case studies, girls who were exposed to high levels of androgens prenatally exhibited masculine behaviors and interests—even if they were raised as girls (Hines, 2006). They enjoyed rough-and-tumble play and vigorous athletic activities and showed little interest in playing with dolls, babysitting, or caring for younger children. They preferred boys as playmates and chose toys usually preferred by boys. The greater the girl's exposure to androgen when a fetus, the stronger were her preferences for masculine play and activities (Berenbaum et al., 2000). In other human case studies, genetic males born without a penis or with a very small one who underwent sex reassignment surgery and were raised as girls exhibited typical male behavior such as rough-and-tumble play and had many male friends (Reiner & Gearhart, 2004). Although there is still no clear answer concerning the relative influences of biology and environmental factors, it is evident that biology plays an important role in gender-role development (Berenbaum, 2006).

Hormones and Cognitive Skills

Researchers have suggested that at a critical period in prenatal development, sex hormones may determine a fetus's brain organization, and this, in turn, may lead to gender differences in males' and females' verbal and spatial skills. Support for this suggestion comes from studies showing that when prenatal androgen levels in female fetuses are exceptionally high, girls have better visual-spatial skills than other girls (Hines, 2004; Hines et al., 2003). Other methods of assessing prenatal hormone concentrations, including analysis of umbilical cord blood, amniotic fluid, maternal serum during pregnancy, and finger-length ratios, also show masculinizing effects of prenatal androgens on spatial abilities, especially at high doses of androgens (Cohen-Bendahan et al., 2005). Even if researchers have established a biological basis for the gender difference in spatial abilities, however, it does not mean that these abilities were unaffected by culture or unmodifiable by the environment (Berenbaum, 2006; Ruble et al., 2006). Hormonal differences between males and females may contribute to their spatial abilities,

but environmental factors modify these biologically influenced patterns of differences between males and females.

Brain Lateralization and Gender Differences

Another biological difference between males and females that may contribute to differences in cognitive abilities is the extent to which brain functioning is organized across the two cerebral hemispheres. As we discussed in Chapter 5, in most people, the right hemisphere is more involved in processing spatial information and the left hemisphere in processing verbal information. However, there is some evidence that men's brains are more lateralized than women's; that is, their hemispheres are more specialized than women's. Men whose left hemispheres are damaged are more likely than women with left-hemisphere damage to experience verbal deficits, and men whose right hemispheres are damaged show more spatial deficits than women with right-hemisphere damage (Halpern, 2000). Studies using brain-imaging techniques that detect blood flow in the brain as people perform different cognitive tasks confirm the greater lateralism among males. In a task in which men and women were asked to decide if nonsense words rhymed, both left and right sides of women's brains were activated; in men, however, only the left hemisphere was activated (Shaywitz et al., 1995). Even infants show this gender difference in patterns of brain activation in a word-comprehension task (Hines, 2004).

Biological Programming and Cultural Expectations

Researchers have asked what role biological "programming" plays in shaping both gender-role standards and gender typing. For example, are women's abilities to have and to breast-feed a baby related to some kind of biological programming that causes girls to be more responsive than boys to the sights and signals of infants and children? Investigators have found that by the age of 4 or 5, girls interact more with babies and, when asked to care for a baby, are more likely to engage actively, whereas boys are inclined to watch the baby passively (Berman, 1987; Blakemore, 1990). These observations are consistent with the evolutionary theoretical perspective that argues that females are more committed to parental activities than males. Similarly, evolutionary theory argues that males' greater visual-spatial ability is rooted in the distant past, when males' major activity was hunting (Buss, 2000; Geary, 2006).

These behavioral tendencies, however, could as easily be due to cultural expectations. In adolescents and adults, they are more apparent when people know that someone is observing them (Berman, 1987). When experimenters have used subtle measures of responsiveness to an infant's crying, such as changes in blood pressure, electrical skin conductance, or other responses of the autonomic nervous system, they have not detected any differences in mothers' and fathers' responses to a child (Lamb, 2004). Biological and evolutionary programming notwithstanding, culture has a considerable impact on males' and females' behavior toward infants and children. Similarly, males' superior visual-spatial ability is fostered by culture, as boys are encouraged more often than girls to play with toys that involve spatial abilities, such as building sets, and to undertake mathematical and scientific endeavors (Beal, 1994). Experience with blocks, models, and video games, moreover, enhances spatial skills (Subrahmanyam et al., 2001).

COGNITIVE FACTORS IN GENDER TYPING

Biology and culture are not the only determinants of gender typing. Children's own understanding of gender roles and rules contributes to the process of gender-role acquisition.

Turning Points

In this section, we explore two cognitive approaches to gender typing: Kohlberg's cognitive developmental theory and an information-processing-based approach called gender-schema theory.

Kohlberg's Cognitive Developmental Theory

cognitive developmental theory of gender typing Kohlberg's theory that children use physical and behavioral clues to differentiate gender roles and to gender-type themselves very early in life.

In his **cognitive developmental theory of gender typing**, Lawrence Kohlberg (1966) proposed that children's differentiation of gender roles and their perception of themselves as more like same-gender than opposite-gender models begin very early. Children, using physical and behavioral clues such as hairstyle or playing with trucks, categorize people, including themselves, as male or female; they then find it rewarding to behave in a gender-appropriate manner and to imitate same-gender models. For example, a girl's thinking goes something like this: "I am a girl because I am more like my mother and other girls than like boys; therefore, I want to dress like a girl, play girl games, and feel and think like a girl." Consistency between the child's perceived gender and the way the child behaves is critical in sustaining self-esteem.

Kohlberg believed that children go through three phases in gaining an understanding of gender. First, between the ages of 2 and 3, they acquire basic gender identity, recognizing that they are either male or female. Second, by the age of 4 or 5, they acquire the concept of **gender stability**, accepting that males remain male and females remain female. The little boy no longer thinks he might grow up to be a mommy, and the little girl gives up her heady hopes of becoming Spiderman. Third, by about 6 or 7,

gender stability The notion that gender does not change; males remain male and females remain female.

4–5 YEARS	• Children begin to understand the concept of gender stability but do not grasp it fully until about the age of 7
	• Children 4 and younger tend to rely more on gender schemas than do children 5 and older
	• By 4.5, children spend three times as much time with same-gender playmates as with other-gender peers
	• Girls interact more with babies and in a more active way than boys do
5 YEARS	• Few children this age show knowledge of personality traits
4–6 YEARS	• Boys are more likely than girls to congregate in same-gender groups
6.5 YEARS	• Children spend 11 times as much time with same-gender playmates as with other-gender children
6–7 YEARS	• Children now understand gender stability and also grasp gender constancy
7–11 YEARS	• Children develop distinct patterns of interest in activities that are consistent with cultural gender stereotypes
8 YEARS	• Most children display knowledge of gender-typed traits
8–13 YEARS	• Studies of children in this age range suggest that female brains may be more bilaterally organized than male brains

children acquire the notion of **gender constancy**, recognizing that superficial changes in appearance or activities do not alter gender. Even when a girl wears jeans or plays football, or when a boy wears long hair or has a burning interest in needlepoint, the child recognizes—and peers recognize, too—that gender remains the same.

Researchers who have tested Kohlberg's theory in the United States and in other countries have confirmed that both boys and girls acquire gender identity first, an understanding of stability next, and finally, an appreciation of consistency (Martin & Little, 1990; Slaby & Frey, 1975). Working-class children and children in nonindustrialized cultures generally reach these milestones about a year later than middle-class American children (Frey & Ruble, 1992).

Some researchers have suggested that the process by which children come to recognize males and females as distinct categories probably has its origins in infancy—well before babies can understand labels and language. In one study, 75% of 12-month-old infants were able to recognize male and female faces as belonging to distinctive categories (Leinbach & Fagot, 1992). This is not the same as recognizing that you yourself belong to one of these categories, but it does suggest that the process of understanding gender begins even earlier than Kohlberg originally thought.

The ability to understand gender labels such as boy and girl is not far behind. By the time they are 2 years old, children can correctly label their own gender, but they still have a very limited understanding of gender identity (Fagot & Leinbach, 1992). Young children have some understanding of gender words such as man and woman and recognize that some activities and objects are associated with each gender. For example, they recognize that men wear neckties and women don't and that women sometimes wear skirts but men never do. It's not until they're about 3 years old, however, that they grasp the concept that they themselves, along with other children, belong to a gender class or group. Considerably later (around age 7), children have a complete understanding of gender constancy. Consider the following exchange between two preschool boys. Jeremy,

gender constancy The awareness that superficial alterations in appearance or activity do not alter gender.

These children do not seem worried that either rock climbing, stereotypically a male activity, or baking, often considered a female task, will affect their gender identities. Clearly, they have grasped the notion of gender constancy.

who wore a barrette to nursery school, was accused by Leo of being a girl because "only girls wear barrettes." Jeremy pulled down his pants to show that he really was a boy. His young classmate replied, "Everyone has a penis; only girls wear barrettes" (Bem, 1983, p. 607). Clearly, Leo did not yet understand gender constancy.

Genital knowledge is an important determinant of gender constancy (Ruble et al., 2006). Bem (1989, 1993) showed preschool children anatomically correct photos of a nude boy and girl and then showed the youngsters pictures of the same children dressed in either clothing appropriate to their gender or clothing appropriate to the opposite gender. Even when boys wore dresses or girls wore pants, nearly 40% of the children correctly identified the gender of the child. When Bem then tested the preschoolers' understanding of genital differences between the sexes, she found that nearly 60% of the children who possessed genital knowledge, but only 10% of those who lacked it, had displayed gender constancy.

Kohlberg's theory was not entirely accurate in predicting that children would behave in more gender-typed ways after they fully understood gender constancy. However, research has shown that children who had developed gender identity engaged in more gender-typed play at age 2 than children who gained gender identity later; the boys were more likely to play with trucks and trains, and the girls more likely to be in the doll corner (Fagot & Leinbach, 1989). Girls who had acquired gender stability chose to play with other girls more than did girls who acquired gender stability later (Smetana & Letourneau, 1984). And 5-year-old children who understood gender constancy were more attentive to same-sex characters on television than were children with less understanding of gender constancy, as shown in Figure 13-3 (Luecke-Aleksa et al., 1995).

Gender-Schema Theory: An Information-Processing Approach

gender-schema theory
The notion that children develop schemas, or naive theories, that help them organize and structure their experience related to gender differences and gender roles.

According to **gender-schema theory**, children develop *schemas,* or naive theories, about gender that help them organize and structure experience related to gender differences and gender roles (Bem, 1998; Martin & Ruble, 2004). These schemas tell the child what kinds of information to look for in the environment and how to interpret such information. Martin and Halverson (1983) demonstrated the importance of gender-role schemas by showing 5- and 6-year-olds pictures of males and females involved in
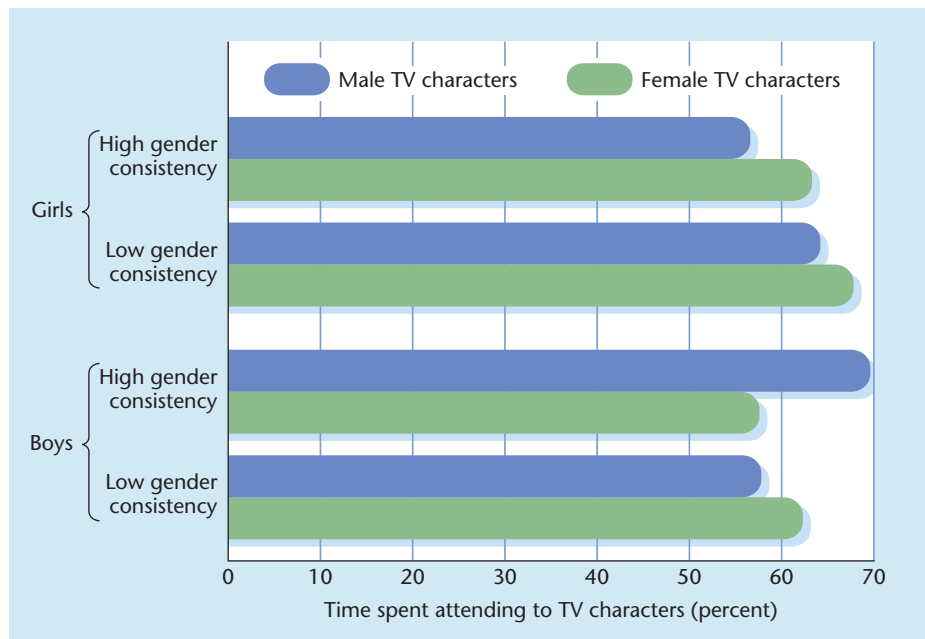
activities that were either gender consistent (e.g., a boy playing with a train) or gender inconsistent (e.g., a girl sawing wood). A week later, the researchers asked the children to recall the pictures. When they were asked to recall the gender-inconsistent pictures, children tended to distort information by changing the gender of the actor—presumably because they had schemas for what was gender appropriate. Some children are particularly "gender schematic" and are more attentive to gender cues They are the ones who display better memories for gender-consistent information and are more likely to distort gender-inconsistent information (Levy, 1994). The degree to which children rely on gender schemas in interpreting their social world changes with age (Ruble et al., 2006). Preschool children rely more on gender schemas than elementary school children because older children have more complete and elaborate knowledge of gender roles, attach less importance to these roles, and are less rigid in applying their knowledge.

Children develop schemas through their own perceptions and based on information provided by parents, peers, and cultural stereotypes ("boys don't wear pink"). They use these gender schemas to evaluate and explain behavior. For instance, when they were told about a child who spilled some milk, children evaluated the behavior more negatively if the child was a boy because of the stereotype that boys are bad (Giles & Heyman, 2004; Heyman & Giles, 2006). They appraised the risk of injury as higher for girls than for boys because of the stereotype that girls are fragile—even though boys actually incur more injuries than girls do (Morrongiello et al., 2000). The links between gender schemas and the child's own behavior are presumed to occur through selective attention to and memory for own-sex relevant information and through motivation to be like same-sex others.

INFLUENCE OF THE FAMILY ON GENDER TYPING

Parents have a significant impact on children's gender-role behaviors and gender typing, acting as interaction partners, direct instructors, and providers of opportunities to learn sex-role attitudes and behaviors (McHale et al., 2003). They speak differently to infant boys and girls, hold and move them differently, and choose different clothes and toys for
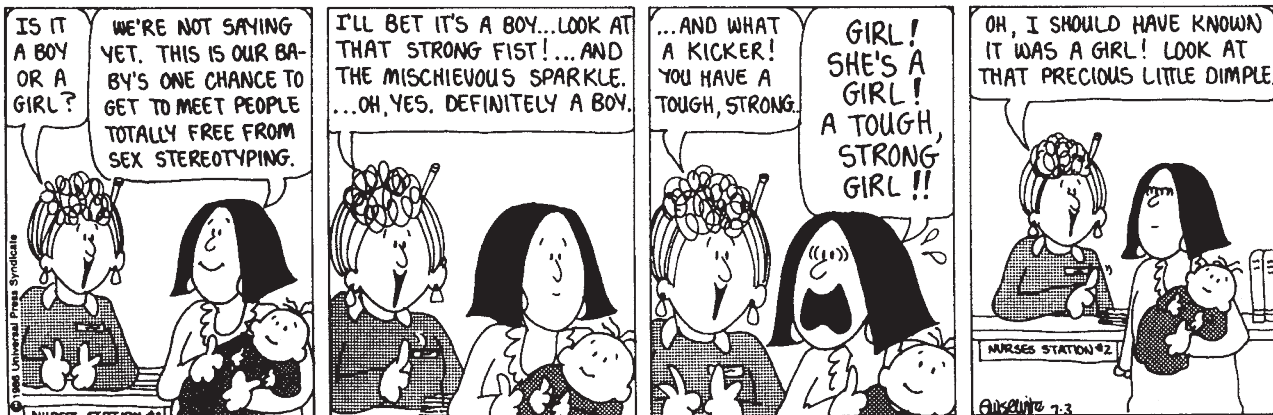
them. As children get older, their parents encourage them in gender-appropriate activities and disapprove of their gender-inappropriate actions. Parents also provide models that children can follow in developing their gender-role choices and behaviors. They provide different opportunities for boys and girls to learn sex-typed behaviors by enrolling them in different gender-typed activities, clubs, and sports (Leaper & Friedman, 2007).

Parents' Influence on Children's Gender-Typed Choices

Well before children make lists of toys they'd like for their birthdays or holidays, parents are actively shaping their children's tastes and preferences. Have you ever compared the bedrooms of girls and boys? Researchers have recorded the kinds of toys, decorations, furniture, and even the curtains and bedspreads that adorn the bedrooms of boys and girls between 1 month and 6 years old (Pomerleau et al., 1990; Rheingold & Cook, 1975). Boys' rooms contained more vehicles, machines, army equipment, soldiers, and sports equipment. In contrast, girls' rooms were more likely to house dolls and floral-patterned and ruffled furnishings. Boys' toys were more action oriented; girls' toys were less action oriented and more family focused. There was little difference between children's rooms in the 1970s and the 1990s. Parents also subtly shape their children toward "appropriate" gender roles by the way they dress them (Leaper & Friedman, 2007; Parke & Brott, 1999). When a group of researchers watched 1- to 13-month-olds in a shopping center, they found baby girls in pink, puffed sleeves, ruffles, and lace. Boys wore blue or red but few bows, barrettes, or ribbons (Shakin et al., 1985). Gender-typed clothing serves not only to announce a child's gender but to ensure that even strangers will respond to the child in gender-appropriate ways.

Parents' Behavior Toward Girls and Boys

Both mothers and fathers tend to behave differently with their sons and daughters, but fathers are especially likely to treat them differently (Leaper & Friedman, 2007).

INFANTS AND TODDLERS   From earliest infancy, parents view sons and daughters as different. They describe their newborn daughters as smaller, softer, cuter, more delicate, and more finely featured than their sons. Fathers, even if they have only seen and not yet handled their infants, are more extreme than mothers in emphasizing

When we first meet an infant, we often use clothing as a clue to the child's gender. If the beruffled infant in pink and the baby decked out in blue exchanged clothes, would you be able to make an accurate judgment of the first as a girl and the second as a boy?

the size, strength, coordination, and alertness of sons versus the fragility and beauty of daughters (Rubin et al., 1974; Stern & Karraker, 1989). These expectations are consistent with predictions from an evolutionary theoretical approach to gender differences, which emphasizes strength and competitiveness in boys and nurturance in girls (Geary, 1998). Researchers have found that adult strangers will play in more masculine ways with a baby they have been led to believe is a boy and in a gentler fashion with an infant they think is a girl, regardless of the infant's actual gender.

Fathers are more likely to play and talk with infant sons than with daughters, especially when the new babies are firstborns (Parke, 2002; Schoppe-Sullivan et al., 2006). As children grow older, fathers spend more time in play with male toddlers, and they watch and touch them more. They indulge in rough-and-tumble antics with male infants and may talk with them in a kind of macho way, saying things like "Hey, Tiger!" "What's up, Bud?" (Parke, 2002). Fathers are more likely to cuddle their infant daughters gently than to engage in active play with them. Mothers tend to treat female and male babies pretty much the same way (Leaper, 2002; Lytton & Romney, 1991; Siegel, 1987). Both parents, however, are more verbally responsive to girls; they talk to them more, and they use more supportive and directive speech with daughters than they do with sons (Leaper & Friedman, 2007; Leaper et al., 1998).

This pattern of differences in mothers' and fathers' interactions with sons and daughters suggests that the social forces involved in gender-role typing begin at birth and that fathers, through their more markedly different treatment of boys and girls, may play a more important role in the gender-typing process than do mothers.

OLDER CHILDREN   As children grow older, parents actively encourage and reinforce them for behaving in a gender-stereotypic manner. Langlois and Downs (1980) observed how mothers and fathers reacted to their 3- and 5-year-old girls' and boys' play, purposely manipulating the children's choices of toys. Both "masculine" toys, such as soldiers and a gas station, and "feminine" toys, such as a dollhouse and kitchen utensils, were available to the children, but the researchers specifically told them to play with the toys that were either gender appropriate or not. They then recorded parents' reactions to their children's choices of toys, mothers in one session and fathers in another. Fathers consistently exerted pressure on their children—both boys and girls—to play with gender-typed toys. They were also quite consistent in rewarding both sons and daughters for play with gender-appropriate toys and in punishing them for play

with opposite-gender toys. With daughters, mothers took the same approach, but their responses to their sons were inconsistent: They sometimes punished and sometimes rewarded them for playing with opposite-gender toys.

These findings are consistent with other evidence that men are more likely than women to gender-type toys and to purchase them, especially for boys (Fisher-Thompson, 1990). They are also consistent with the view that the father is the principal agent of gender-role socialization and that the mother is less influential in this process (Parke, 2002).

Another difference in the way parents treat girls and boys is that they are more protective of girls' than of boys' physical well-being. Parents tend to encourage dependence and close family ties in girls and to put more emphasis on independence, early exploration, achievement, and competition in boys (Ruble et al., 2006). They have similar expectations for boys' and girls' independence and maturity in relation to such safe activities as tidying up rooms, putting away toys or clothes, or getting dressed, but they treat boys and girls differently in areas where there are greater risks. Parents generally think boys should be able to play away from home without telling parents where they are, run errands in the neighborhood, cross the street alone, use sharp scissors, and indulge in other venturesome activities at an earlier age than girls. Parents are also less likely to pick up or supervise boys after school. Moreover, parents often communicate these messages quite directly: Pomerantz and Ruble (1998) found that parents were more likely to tell sons specifically that they were free to do certain activities than they were to grant such freedom to daughters. Mexican American parents, especially fathers, are particularly likely to restrict their daughters' out-of-home activities (Parke & Buriel, 2006).

Not all cultural groups make these gender-based distinctions. As we mentioned earlier, African American parents treat boys and girls more similarly than do European American parents. Many psychologists are concerned, however, that among groups that do tend to gender-type their children along traditional lines, girls may suffer. Restricting girls' freedom more than boys' may lead girls to lack feelings of self-efficacy and to discourage them from exploring their worlds and taking intellectual and creative risks. Under these conditions, girls may continue to be much more likely than boys to conform to cultural norms and values; clearly, this may sometimes be useful, but it may also be detrimental (Ruble et al., 2006).

Parents' gender-differentiated behaviors often seem to be associated with an interest in their children's achievement. Fathers, who are particularly prone to differentiate between boys and girls in this regard, are more likely to stress the importance of a career or occupational success for sons than for daughters. Differential treatment of boys and girls is particularly marked in the area of mathematical and scientific achievement (DeLisi & McGillicuddy-DeLisi, 2002). For example, parents are likely to encourage boys more often than girls to work on math or science-related activities at home (Eccles et al., 2000). In one study, even when families visited a science museum, parents were more likely to explain interactive exhibits to their sons than to their daughters (Crowley et al., 2001). In another study, fathers of sons used more explanations and scientific vocabulary than fathers of daughters when instructing their child on a physical science task (Tennenbaum & Leaper, 2003).

Fathers of girls seem less concerned with performance and more concerned with interpersonal interactions with their daughters (Block, 1983). Even mothers, when reading bedtime stories, teach their boys more than their girls. They supply unfamiliar names to sons ("Look, here's a giraffe. Can you say giraffe?"), but with daughters, they emphasize enjoying the time spent with them (Weitzman et al., 1985), or they focus on feelings and emotions rather than the cognitive aspects of the exchange (Cervantes & Callanan, 1998). These parental behaviors are not lost on children. Eccles and her colleagues (Eccles et al., 1993; Wigfield et al., 2006) found that when they controlled for children's actual skills in English, math, and sports, the children's performance and perception of their own competence matched their parents' stereotyped expectations. The good news is that girls do better when their parents endorse more gender-egalitarian attitudes and are more balanced in their treatment of boys and girls (Leaper & Friedman, 2007; Updegraff et al., 1996).

When One Parent Is Absent

Particularly because the father plays such an important role in gender typing, we might expect that children from families in which the father is absent would show disruptions in gender typing. When fathers are permanently gone owing to divorce or death, when they are temporarily absent or unavailable because of occupational demands or wartime service, and when they simply show little interest in their children, young boys especially may have problems with gender identity and gender role (Ruble et al., 2006). Disruptions in gender roles are most likely if the separation occurred when the child was very young (Hetherington, 1966). As children get older and have wider social contacts, other models such as peers, siblings, surrogate fathers, teachers, and people in the mass media can mitigate the effects of father absence on gender-role adoption (Ruble et al., 2006).

The effect of parental absence on gender typing in girls is minimal. However, parental absence may have a delayed effect on girls' gender typing in adolescence. Father absence may cause adolescent daughters to have difficulties relating to other males; these difficulties may take different forms for daughters of widows and of divorcées. Adolescent girls from divorced homes have been observed to be more sexually precocious and assertive with males, whereas girls whose mothers were widowed were characterized as excessively anxious about sexuality and as shy and uncomfortable around males (Hetherington, 1991a; Newcomer & Udry, 1987).

Following girls in the United States and New Zealand from age 5 to 18, Ellis and colleagues (2003) found that father absence (due to divorce or unmarried motherhood) was associated with elevated risk of early sexual activity and adolescent pregnancy. Moreover, girls who suffered father absence early in life had the highest rates of sexual activity and pregnancy (see Figure 13-4). These links between father absence and sexual behavior were still evident even after the researchers controlled for adverse family
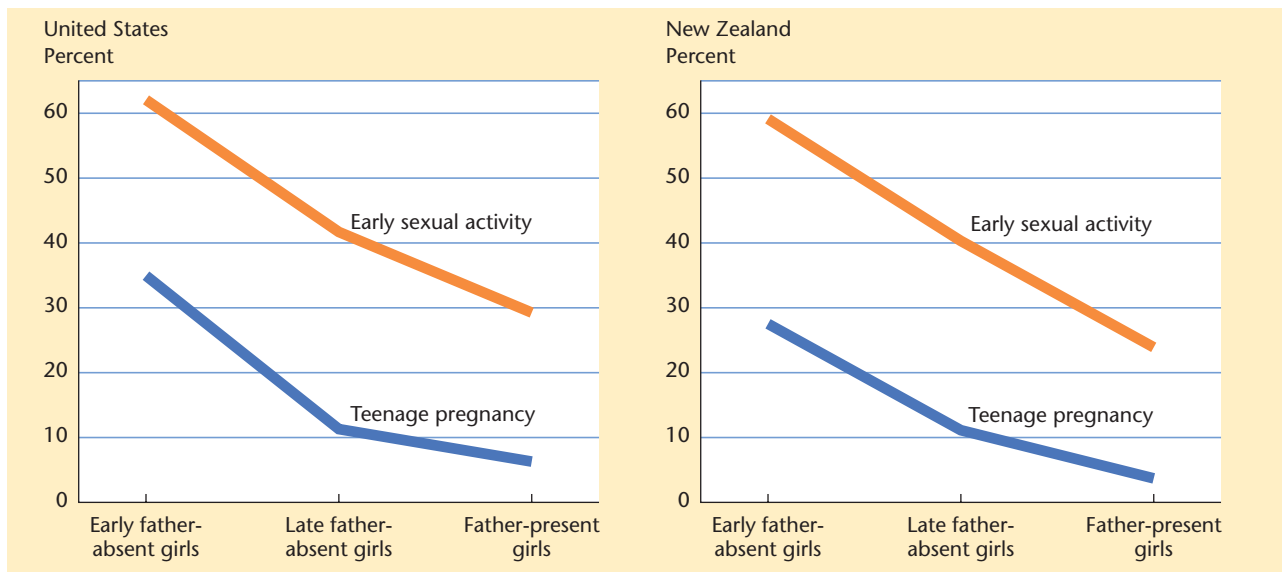
Figure 13-4

The effects of father absence or presence on girls' early sexual activity and teen pregnancy

Teenage girls in both the United States and New Zealand were far more likely to engage in early sexual activity when, at an early age, they were bereft of their fathers, and even girls who lost their fathers later in their development were more likely to engage in such activity than girls whose fathers were consistently present. A similar pattern was found for rates of teenage pregnancy.

Source: Ellis et al., 2003.

and economic conditions, such as poverty, exposure to violence, inadequate parental guidance, and lack of supervision.

What explains these relations between father absence and female sexual risk taking? According to social learning, daughters learn to feel competent and to value and acquire the social skills necessary for effective heterosexual relationships by interacting with warm, responsive, masculine fathers who reward and enjoy their daughters' femininity. The father-absent girls not only lacked positive male models but may also have been exposed to irresponsible dating and repartnering on the part of their mothers, which may have encouraged earlier sexual behavior.

According to the evolutionary perspective, girls in homes without a father view male parental investment in families as unreliable and unimportant (Ellis & Bjorklund, 2005; Ellis & Essex, 2007; Geary, 1998, 2006). As a result, these girls are more likely to be casual in their sexual encounters and thus risk pregnancy. Mothers can moderate the effects of father absence on their daughters, however. Women who cast their former husbands and their relationships with them in a positive light, and who themselves demonstrate emotional stability, can lessen the deleterious effects of father absence.

Gender Roles in Children of Gay and Lesbian Parents

Studies of children growing up in lesbian or gay households have challenged the importance of the father's contribution to gender typing. Children reared in lesbian families do not differ in gender-role behavior from children reared in heterosexual households. Boys and girls in lesbian homes choose traditionally gender-oriented toys, activities, and friends. Nor is there evidence that children reared in lesbian households are likely to develop a gay or a lesbian sexual orientation (Patterson & Hastings, 2007).

Similarly, evidence suggests that boys raised by gay fathers are largely heterosexual in their sexual orientations and that this is true regardless of how long sons lived with their gay fathers (Bailey et al., 1995; Patterson, 2004). As we discussed in Chapter 11, the socioemotional adjustment of children in lesbian households seems very similar to that of children reared in traditional families. Research in this area has raised important questions about the role of environmental and biological influences on the development of gender-related orientations and behaviors. Although fathers do appear to have the greater role in children's gender-role typing, these studies suggest that children can learn gender roles in a variety of family arrangements.

Siblings as Gender Socialization Agents

Siblings as well as parents can influence children's gender choices, attitudes, and behaviors. In a longitudinal study, researchers assessed whether the gender-role attitudes, leisure activities, and personality qualities of firstborn children predicted these same outcomes in their second-born siblings 2 years later (McHale et al., 2001). They found that older siblings did indeed influence younger siblings' gender typing. Moreover, the links between siblings' attributes were stronger than the links between a child's attributes and those of the mother or father. Moreover, second-born children were more likely to model their older, firstborn siblings than the other way around.

The sex of the older sibling matters, too. Children with sisters tend to develop more feminine qualities, whereas those with brothers generally develop more masculine qualities (Rust et al., 2000). In one study, brother-brother pairs engaged in more stereotypically masculine play (e.g., play with balls, vehicles, or toy weapons); sister-sister or older sister–younger brother pairs engaged in more feminine play (e.g., art activities, doll play, playing house) (Stoneman et al., 1986). Children who had an older sibling of the other sex also had less stereotypical gender-role concepts.

EXTRAFAMILIAL INFLUENCES ON GENDER ROLES

Families are the first among many social forces that play a role in shaping gender-linked behaviors. As children get older, influences outside the family become increasingly important. Among the earliest of these influences are books and television. Peers and teachers also have considerable impact on a child's gender roles. In this section, we explore some of the forces that contribute to children's amazingly clear distinctions about what's gender appropriate and inappropriate, "boyish" or "girlish."

Books and Television

Although there has been pressure within educational circles for more egalitarian treatment of boys and girls, children's literature, schoolbooks, and television programs still contain many gender stereotypes. There has been a shift toward more equal representation of boys and girls in children's books over the past several decades, but boys still appear more often in titles and in pictures than girls do (Gooden & Gooden, 2001; Purcell & Stewart, 1990). Moreover, books still often show females as more passive, dependent, and engaged in a narrower range of occupations than men and show males as more assertive and action oriented (Turner-Bowker, 1996). This gender stereotyping is evident even in books labeled as "nonsexist" (Diekman & Murnen, 2004).

Males on television are more likely than females to be depicted as aggressive, decisive, professionally competent, rational, stable, powerful, and tolerant. Females tend to be portrayed as warmer, more sociable, more emotional, and happier. When women on television are aggressive, many times they are also seen as inept or unsuccessful, and they are more likely to be shown as victims than as initiators of violence. This is true for prime time as well as children's television programming. Even in prime-time shows, females are less likely to be leading characters and more likely to be in comedy roles, to be married or about to be married, and to be younger than males (Huston & Wright, 1998; Comstock & Scharrer, 2006), although there is a trend, as in books, toward depicting women in a wider range of occupational roles (Coltrane, 1998; Douglas, 2003; Coltrane & Adams, 2008). In fact, according to a recent survey, only 4% of female TV characters were portrayed as homemakers (Heintz-Knowles, 2001).

Even in television commercials, males more often portray authorities and make more voice-over comments about a product's merits. Women are more likely to play the role of the consumer, displaying interest in product demonstrations (Coltrane, 1998). When women are shown as experts, they are likely to be discussing food products, laundry, soap, or beauty aids. These trends have been identified in other countries as well as the United States (Best & Williams, 1993; Singer & Singer, 2001).

The likelihood that these stereotypical presentations of male and female roles have a real impact on children is underscored by findings that children who are heavy TV viewers are more likely to have stereotypical notions of gender and race and to show conformity to culturally accepted gender-role typing (Berry, 2000; Ward & Friedman, 2006). When television was first introduced in a small town in Canada (see the discussion of natural experiments in Chapter 1), analysts recorded marked increases in traditional gender attitudes (Kimball, 1986; MacBeth, 1996). Moreover, experimental studies of TV advertisements that were targeted either to boys (action toys) or to girls (dolls, fashion, beauty) showed that the ads shaped children's toy requests (Robinson et al., 2001). The specific programs children watch may be guided by their gender schemas, and what they watch may shape their gender beliefs (Leaper & Friedman, 2007).

Television can also be used to change children's gender-role stereotypes. In one study, 5- and 6-year-olds who were shown a cartoon in which the characters played nontraditional roles (girls helped boys build a clubhouse) subsequently expressed less

conventional gender-role attitudes (Davidson et al., 1979). Similarly, *Freestyle,* a television series that tried to counteract gender and ethnic stereotypes, was moderately successful in increasing children's acceptance of nontraditional gender-typed behaviors. For example, 9- to 12-year-old viewers were more accepting of girls who participated in athletics and mechanical activities and of boys who engaged in nurturant activities (Johnston & Ettema, 1982). However, the effects of most TV-based interventions have been relatively modest and short-lived and are more effective with younger than with older children (Bigler & Liben, 1992; Comstock & Scherrer, 2006). It will probably take much more change in books and television to alter gender-role stereotypes and attitudes.

Peers, Gender Roles, and Gender Segregation

Peers often serve as enforcers of society's gender-role standards, and they may also help to define them. In these roles, peers may help individual children define themselves and their gender identities (Leaper & Friedman, 2007; Rose & Rudolph, 2006). Observing 200 preschoolers at play over several months' time, Fagot (1985a) found that peers displayed marked reactions when children violated appropriate gender-role behavior patterns. Boys who played with dolls rather than trucks had a tough time; their classmates criticized them five to six times more often than they heckled children who conformed. Peers weren't as harsh in their treatment of girls who would rather play firefighter than nurse, though; they tended to ignore rather than criticize these girls. When same-sex peers rewarded children for appropriate gender-role behavior, the children tended to persist longer in the rewarded type of activity. Boys responded to feedback from boys but not from girls, and girls were more receptive to feedback from other girls. This pattern of responsiveness leads to gender segregation, which in turn provides additional opportunities to learn accepted gender roles (Fagot, 1985a; Maccoby, 1998).

On any school playground, you can see that children have a very strong tendency to associate and play with children of the same sex. When children are 4.5 years old, they spend nearly three times as much time with same-sex play partners as with children of the other sex. By age 6.5, the effect is even stronger: Children spend 11 times as much time with same-gender as with opposite-gender partners (Maccoby, 1998). Gender segregation is particularly marked for boys (Benenson, Apostoleris, & Parnass, 1997). Children also like same-gender peers better than opposite-gender peers and are less likely to behave negatively toward them (Underwood et al., 2001).

Martin and Fabes (2001) followed preschoolers throughout the school year. They found not only an increase in gender segregation but increasing gender differences in activities when children were in same-gender groups. The more time boys spent with other boys, the more active they became. They engaged in more and more rough-and-tumble play and overt aggression, spent less time with or near adults, and seemed to have more fun. In contrast, girls in groups with other girls showed a drop in activity level, their aggressive behavior lessened, and they spent more time in proximity to adults. Consistent with these findings is the fact that preschool boys choose high-activity friends, whereas girls choose low-activity friends; in short, children choose friends that suit the level of activity that is within their comfort zone (Gleason et al., 2005). Similarly, girls are less competitive with their friends than are boys (Schneider et al., 2005).

These differences in activities in boys' and girls' groups led Maccoby (1998) to suggest a couple of reasons for gender segregation. First, girls view boys' rough-and-tumble play style and competition-dominance orientation as aversive; as a result, girls avoid interactions with boys. Second, girls find it difficult to influence boys. They influence each other successfully using their preferred method of making polite suggestions, but these tactics are not very effective with boys, who prefer more direct demands. Girls

find it aversive to try to interact with children who are unresponsive, and they avoid such partners.

Gender segregation in childhood occurs in many cultures, not only the United States but also India, Europe, and some African countries. It occurs without adult encouragement, guidance, or pressure. Although earlier parental influence may play a role in setting the process in motion, children spontaneously choose same-gender play partners. Individual children may differ in their masculinity or femininity, or in their grasp of gender stability and gender constancy, but they all show the same preference for same-gender playmates (Maccoby, 1998). Thus, from preschool onward, children live in segregated play worlds that, in turn, encourage separate styles of interaction that are distinctly male and female. This **self-socialization** as children spontaneously hang out with same-sex playmates and adopt gender-appropriate behavior is another way that boys and girls learn gender roles. Of course, gender segregation is not permanent; by adolescence, interest in opposite-sex partners is in full swing (Larson et al., 2002).

self-socialization The child's spontaneous adoption of gender-appropriate behavior.

Schools and Teachers

Teachers and schools deliver a number of gender-related messages to children (Leaper & Friedman, 2007; Ruble et al., 2006). For one thing, the structure of the school system is predominantly male; men hold many more positions of power, such as principal and superintendent, while the teaching staff is predominantly female. In addition, teachers sometimes structure classroom activities by gender and provide differential rewards and punishments to boys and girls. In this section, we consider the differential impact of the school culture and environment on girls and boys, and we explore some specific effects of teachers' attitudes and practices.

THE SCHOOL CULTURE   Although teachers often seem to pay more attention to boys than to girls, the general culture of the classroom and the school in some ways favors girls. The school system tends to frown upon the independent, assertive, competitive, and boisterous qualities that parents and the culture have encouraged in boys from infancy. Girls, who are more verbally oriented, generally better behaved, and better at following rules, typically experience greater acceptance from teachers who—at least in the early grades—are likely to be female. It is not surprising, then, that from the start girls tend to like school more than boys and to perform better in their academic work. For many boys, school is not a happy place. They feel that their teachers like them less than girls, and they have more difficulty adjusting to school routines. They create more problems for teachers and elicit more criticism from them, and most important, they often perform at a level that is not only lower than their female classmates' but well below their own abilities (McCall et al., 2000; Ruble et al., 2006).

Teachers may segregate a child from the rest of the class for a period of time as a way of controlling unruly behavior. Many more boys than girls get the "time-out" treatment.

If boys perceive school to be a gender-inappropriate institution, they may be less motivated and interested in school-related activities than girls, who are likely to view school as consistent with their own gender-role identity. Girls outperform their male peers in the early grades, especially in reading; some surveys have found that boys are between three and six times as likely as girls to experience problems in learning to read (Halpern, 2000; Lummis & Stevenson, 1990).

However, although girls have an advantage in the early grades, this has a short-lived effect. Girls' achievement levels generally decline as they grow older, and by college, girls are more likely to be underachievers than are boys (Eccles et al., 1993; Wigfield et al., 2006). The kinds of conforming and dependent behaviors that schools encourage in girls may, in the long run, be detrimental. Dependence is negatively related to intellectual achievement; independence,

assertiveness, and nonconformity are much more likely to lead to creative thinking and problem solving and to high levels of achievement in both girls and boys (Dweck, 2001, 2006). The many conflicting messages that girls receive in the school years can put them at risk, if not for failure, for lives that are less than satisfying.

Over the years, psychologists have found that public achievement, particularly in competitive activities, is often threatening to girls and women. Some girls cope with their conflict about achievement by concealing their abilities, particularly from boys (Ruble et al., 2006). For example, a girl may tell a male peer that she received lower grades than she actually did in a course they both attend. Or she may lower her effort, intentionally performing below her capabilities. Even women who are highly successful professionals sometimes seek to disguise their achievement striving by appearing super feminine; they may try not only to be super career women but also super wives, super mothers, and super volunteers. What boy or man would try to hide his ambition and his accomplishments from others? However, if girls can find support from their peer group for their interest in science, their expectations for science achievement increase (Stake & Nickens, 2005). In short, with support and encouragement, these gender differences in achievement can be reduced.

IMPACT OF TEACHERS' ATTITUDES AND BEHAVIORS   Even in the preschool years, teachers respond differently to boys and girls, often reacting to them in gender-stereotypic ways (Fagot, 1985a). Researchers have found that teachers interrupt girls more frequently than boys during conversations and pay more attention to boys' assertive behavior than to girls' pushing and shoving (Hendrick & Stange, 1991). They respond to girls' social initiatives, such as talking and gesturing, more than to these same behaviors in boys. Moreover, although teachers may encourage boys to engage in quiet activities rather than aggressive and rough-and-tumble play, they criticize them for cross-gender behaviors (e.g., dressing up or playing with dolls) more than they criticize girls for cross-gender play (Fagot, 1985a).

Not surprisingly, differential teacher attention has an impact. Fagot (1985a) found that 9 months after she first observed a group of preschoolers, clear gender differences had emerged. Girls talked to the teacher more, and boys exhibited a higher level of assertiveness. Although educators once believed that increasing the number of male teachers would counteract female teachers' differential treatment of boys and girls, Fagot (1985b) discovered that both male and female teachers reacted more positively to children involved in stereotypical female behaviors, such as drawing and helping, regardless of the individual child's gender.

Teachers also influence how well children do in different school subjects. They encourage boys more than girls in mathematical pursuits and stress literature more for girls (Shepardson & Pizzini, 1992; Wigfield et al., 2006). Children pick up on teachers' belief that math is a field for males. Even before high school, boys have greater interest in and higher expectations for success in math and science than girls, whereas girls have more interest and self-perceived competence in reading and writing than boys (Evans et al., 2002). Eccles (2007) found that 668 children in the fifth through the twelfth grades thought boys were better at math and could make more use of it than girls, despite the fact that these children displayed no gender differences in their actual mathematics performance. Nor is this only a North American issue; recently, European researchers (Muzzatti & Agnoli, 2007) found that fourth- and fifth-grade Italian boys are more confident than girls in their math abilities in spite of similar abilities. As they get older, girls express a decreased liking for mathematics and, lacking any positive reinforcement for studying math, are more likely than boys to drop math during their high school years (Shea et al., 2001). In contrast, boys' course enrollment decisions reflect their past performance; if they have done well in math, they continue to take math courses. It seems that educators may need further education about children's educational skills and potential capabilities.

SEXUAL ORIENTATION AND IDENTITY

Most adolescents develop a heterosexual orientation, but a small percentage of children and adolescents realize that they prefer members of their own sex as sexual partners. According to recent estimates (Rotherman-Borus & Langabeer, 2001), between 3 and 6 percent of adolescents identify themselves as gay, lesbian, or bisexual. These are only estimates, for awareness of one's sexual orientation and of one's attraction to same-sex partners comes at different times to different individuals. For some, this occurs in early or middle childhood, but others reach adulthood before recognizing their same-sex preferences. The recognition that one prefers a member of the same sex as a sexual partner is often a gradual process that is marked by a series of milestones. Many gay or lesbian adults report recalling that as children they had feelings that differed from those of their peers (Bailey & Zucker, 1995). Some children as early as fourth grade express doubts about their heterosexuality (Egan & Perry, 2001; Carver et al., 2004). These children responded more negatively to such questions as "Some girls (boys) definitely think they'll get married one day" or "Some girls (boys) definitely think that they will be a mother (father) one day." Compared with children more confident in their heterosexuality, children who questioned their sexual identity reported more impaired self-concepts. They expressed less interest in activities stereotypically linked to their own gender, such as babysitting for girls and building model planes and cars for boys. In addition, they were more likely to feel different from others of their gender and to express dissatisfaction with their own gender assignment. Interestingly, the patterns were similar for both boys and girls.

Across-time analyses suggested that sexual questioning leads to impaired self-concepts rather than the other way around. There is great variability in when sexual questioning begins: studies (e.g., Savin-Williams & Diamond, 2000) suggest that it may start in early and middle childhood, but it may not begin until considerably later. This is especially true for women; a significant minority shift toward a lesbian orientation after being heterosexual or even after motherhood (D'Augelli & Patterson, 2001; Rotherman-Borus & Langabeer, 2001). Although the studies of sexual questioning by children suggest that the process of achieving a sexual identity and orientation starts early, this does not mean that all children who have questions about their sexual orientation will necessarily grow up to be gay or lesbian. At the same time gay and lesbian adults often report that such sexual questioning is part of their childhood history (Bailey & Zucker, 1995). In addition, cross-typed behavior (e.g., boys playing with dolls) is often found in the childhood of gay men.

According to Savin-Williams (1998; Savin-Williams & Cohen, 2004), the next step in the journey toward full acceptance of minority sexual identity is "test and exploration." During this phase, the youth becomes ambivalent about same-sex preferences and begins tentatively to explore these feelings. Next, during the identity acceptance phase, young people begin to accept their orientation and preferences for individuals of the same sex. They may share their sexual preferences with family and friends and may act on those preferences. Adolescent boys begin to label themselves as gay by age 13 and to engage in sex with other boys by age 15. Boys and girls, however, follow slightly different developmental pathways. Boys act first and label later, while girls do the opposite. Boys have sexual encounters with other males and only later label themselves as gay, whereas girls identify themselves as lesbians and later engage in sexual encounters with other females (Savin-Williams & Diamond, 2000).

Identity integration is the final milestone in this identity process. At this juncture, gay, lesbian, and bisexual individuals accept their orientation and acknowledge their identity to others in their family, school, and community. About 55 percent of college students of either sex disclosed their sexual identity to their parents; a decade ago only 45 percent disclosed such information (Savin-Williams & Ream, 2003). And young people are disclosing themselves earlier than in the past—at 17 instead of in the

mid-twenties, as they did a decade ago (D'Augelli, 2006). Mothers are more accepting of their son's or daughter's gay/lesbian sexual orientation than are fathers (D'Augelli, 2004). Moreover, ethnicity and religion are important predictors of acceptance. Some ethnic minorities—especially Asian Americans and Latino Americans—are less tolerant than are European Americans of nonheterosexual orientations (Dube et al., 2001). Similarly, some members of conservative religious groups are less likely to be accepting of sexual-minority youth (D'Augelli, 2006). There is considerable prejudice in many parts of society toward nonheterosexuals, and many (20 to 40%) experience discrimination, rejection, and outright verbal and even physical hostility (D'Augelli, 2006). On occasion, gay teenagers have actually been killed by others owing simply to their sexual preferences. The widely publicized October 1998 murder of Matthew Shepard, in Laramie, Wyoming, led to protests in Washington, D.C., the nation's capital, by those who sought to raise awareness of the potential consequences of antihomosexual beliefs and behavior.

What are the origins of same-sex preferences? Both biological and environmental causes have been proposed. Some genetic evidence supports the notion that identical twins are more likely to show similar sexual orientations than are fraternal twins (Bailey et al., 1993). Other studies (Hamer et al., 1993) suggest that variations in DNA may make it more likely that some boys will develop homosexual preferences.

Family experiences doubtless play a role in this process as well. Distant or hostile relationships with parents of the same gender may lead children to reject behavior typically associated with their same-gender parents (McConaghy & Silove, 1992; Bailey et al., 1995). Indeed, gay men have recalled distant relationships with their fathers, while lesbian women have reported poorer ties with their mothers. The gender of one's siblings may contribute to gay or lesbian identity. Boys who are born later in the family and who have a larger-than-usual number of older brothers were more likely to develop homosexual orientations (Blanchard et al., 1995). However, as we saw earlier in this chapter, there is little support for the view that gay and lesbian parents will produce gay and lesbian children (Patterson & Hastings, 2007). In short, none of these theories has received extensive support, and viewpoints that emphasize multiple pathways to gay/lesbian identity and that involve both environmental and biological factors are likely to be the most fruitful in helping us understand this topic.

ANDROGYNY

Many psychologists believe that traditional ideas of masculinity and femininity have been socially and psychologically destructive. To speak and act as if each individual person is either "masculine" or "feminine" in interests, attitudes, and behaviors make little sense when we know that in reality most people possess a combination of characteristics traditionally viewed as masculine or feminine. Any person, male or female, can be tender and nurturant with children, professionally successful, fiercely competitive on the tennis court, and an excellent cook. Many people are **androgynous**; that is, they possess both masculine and feminine psychological characteristics (Bem, 1981, 1998; Spence & Buckner, 2000). Children, as well as adults, can be androgynous, and these children are less likely to make stereotyped choices of play, activities, and occupations (Harter et al., 1998; Hebert, 2000); they are better adjusted and more creative, too (Norlander et al., 2000). Children who are either masculine or androgynous in their gender identity have higher self-esteem than those with a feminine gender identity (Boldizar, 1991; Ruble et al., 2006). Children who are both accepting of themselves as a typical member of their own gender and feel that it is okay to cross gender boundaries are better adjusted than those who were not secure in their gender role (Carver et al., 2004; Egan & Perry, 2002).

Can children be taught to be more androgynous? Can they learn that fashion models and firefighters can be either males or females? The study we discuss in Box 13-2 suggests that they can, but as the following exchange illustrates, the task may not be easy.

androgynous Possessing both feminine and masculine psychological characteristics.

BOX 13-2

Risk and Resilience

CHILD-REARING IN COUNTERCULTURAL FAMILIES

One of the most powerful demonstrations of the plasticity, or modifiability, of gender roles can be seen in families who deliberately choose to emphasize gender-role equality in their overall lifestyle. These countercultural families often show a high commitment to questioning conventional cultural dictates and institutions. Often products of the 1960s cultural rebellion, these parents frequently endorse more egalitarian attitudes toward gender roles. Do these nontraditional families put children at risk for later adjustment in conventional society, or are children resilient enough to adapt to multiple social worlds?

Beginning in the mid-1970s, the Family Lifestyles Project followed a group of more than 200 of these nontraditional families, studying the relationship between family lifestyle and child development and focusing particularly on the variables that affected the socialization of children (Eiduson et al., 1988; Weisner & Wilson-Mitchell, 1990). All families were European American. Some were composed of single parents, some of common-law couples (living together but not legally married), and some of traditionally married couples. Other families lived in communes or in similar group living arrangements.

Interested in the way parents put their gender-egalitarian values into practice in raising their children, researchers brought the children and their parents to a university center for a daylong visit when the children were about 6 years old. They interviewed the parents on several issues and assessed the children's gender typing in several specific areas: appearance, activities and interests, personal-social attributes (e.g., "adventurous," "considerate," "outgoing," "calm"), and gender-based social relationships.

In comparison with children reared by conventional married couples, the countercultural children were less gender typed in a variety of ways. They were more androgynous in their chosen activities and interests and more likely to assume that girls could be engineers or firefighters and boys could be librarians or nursery school teachers. Indeed, more than 70% of these children gave nongender-typed answers to questions about appropriate occupations for boys and girls, whereas only 40% of the children in the comparison group gave such answers.

It is important to note that these countercultural children were also very like other children in a variety of ways. In their play preferences and in their basic knowledge of the way familiar play objects (e.g., dishes, trucks, dolls, racing cars) are culturally gender typed, they were similar to conventionally reared children. All children acquired the normative cultural schemas for gender typing, regardless of their family lifestyle; they were not counterstereotyped. Instead, these children tended to be **multischematic**: They displayed either conventional or more egalitarian gender-typing schemas depending on the situation or the domain. They have more than one cultural schema available for responding to their world and have developed selective criteria for when to recognize and use either a conventional or an egalitarian schema.

This capacity to be flexible and multischematic is part of a more general pattern that characterizes the kinds of families these children come from. These families regularly engage in negotiations and conversation regarding all kinds of cultural standards, debate and question these standards, and include children in these negotiations. This process encourages children to think about and question beliefs rather than always adopt either conventional or alternative beliefs. It helps children acquire the ability to think about situations and to purposefully select the type of schema best suited for a particular situation. This demonstrates that children are resilient, adaptable, and able to function in a wide range of social contexts.

Some family styles, however, can make children even more rigidly gender typed. Investigators found that children reared in devotional communes that strongly emphasized culturally conventional gender typing were even less likely to be androgynous than children in conventional married families.

A psychologist overheard her 4-year-old son trying to explain her occupation to a young friend:

Son: My mother helps people. She's a doctor.

Friend: You mean a nurse.

multischematic Possessing both multiple cultural schemas for responding to the environment and the necessary criteria for deciding what schema to use in a particular situation.

Making the Connections 13

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 13 and discussions in other chapters of this book.

Chapter 13 Gender Roles and Gender Differences	**Girls are hardier than boys as both fetuses and newborns.** In Chapter 3, "Prenatal Development and Birth," p. 94
	Girls suffer from eating disorders more than boys. In Chapter 5, "The Child's Growth: Brain, Body, Motor Skills, and Sexual Maturation," p. 167
	Children of employed mothers have a more egalitarian gender-role attitude. In Chapter 11, "The Family," p. 415
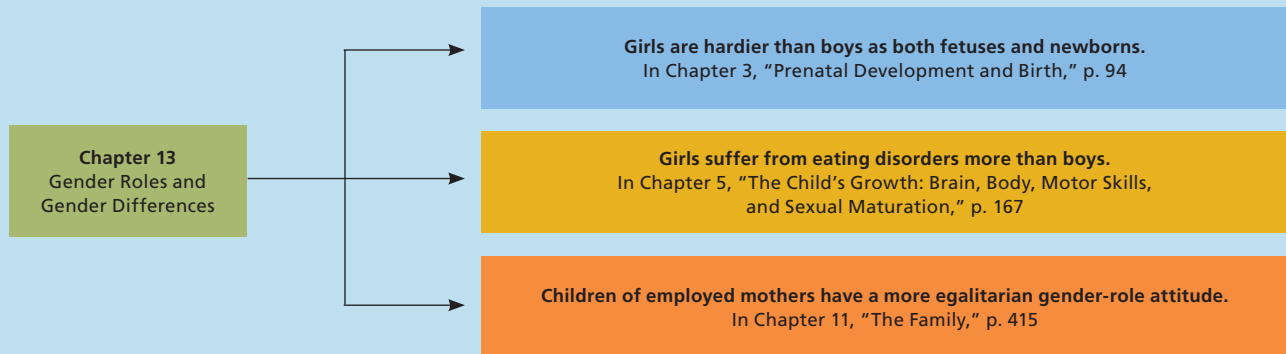
Son: No. She's not that kind of doctor. She's a psychologist. She's a doctor of psychology.

Friend: I see. She's a nurse of psychology.

Work by Bigler and Liben (1990, 1992) suggests that children can learn to use fewer stereotypes. Using 10 occupations that children view as typically masculine (e.g., dentist, farmer, construction worker) or feminine (e.g., beautician, flight attendant, librarian), these researchers tried to reduce children's stereotyping of these work roles. They taught the children, first, that gender is irrelevant. Then they focused the children's attention on two other ways of looking at job appropriateness: liking a job and having the skills needed for the job. For example, construction workers must like to build things, and they must acquire the skill to operate big machines. The investigators gave one group of children practice problems for which they had to specify why the job (e.g., construction worker) was a good match for the person. If the children based their answers on gender rather than on interest or skills, they received corrective feedback. In a control group, children participated in a group discussion about the roles of specific occupations within the community, with no emphasis on gender stereotyping. Children in the experimental group later gave more nonstereotyped answers not only for the occupations involved in the lessons but for a range of other occupations as well. For instance, when they were asked who could do various specific activities, such as police work and nursing, they gave more "both men and women" responses. Children in the control group still argued that "girls can't be firefighters!"

Consistent with the theory of gender schemas, children in the experimental intervention showed better recall of counterstereotypic information in a later memory test. Although children in both the experimental and control groups remembered stories about Frank the firefighter and Betty the beautician, children in the experimental group remembered stories about Larry the librarian and Ann the astronaut far better than did children in the control group. These findings suggest that children's ways of thinking about gender roles can be modified.

Some parents and schools are working toward the goal of reducing gender typing (Bigler, 1995). In open preschools, where the staff consciously attempts to minimize gender stereotyping, children spend more time in mixed-gender groups and less time in conventional gender-typed activities than children in traditional schools. In nontraditional preschools, children of both sexes are likely to be playing house and gassing

up their toy trucks (Bianchi & Bakeman, 1983). Clearly, gender roles and attitudes are modifiable. Some cultures, such as Sweden, have made a commitment to gender equality, and the opportunities to observe males and females engaging in nongender-stereotyped behaviors have resulted in some increases in androgynous attitudes among children (Coltrane & Adams, 2008; Tennenbaum & Leaper, 2002). In the United States, attitudes toward gender roles are changing slowly and will likely continue to change as more and more individuals cross gender lines.

SUMMARY

Defining Sex and Gender

- Both biological and psychological factors influence gender-based behaviors. There are five principal psychological explanations of gender-linked behavior patterns: Freudian theory's process of **identification**, **cognitive social learning theory**, Kohlberg's **cognitive developmental theory of gender typing**, **gender-schema theory**, and **evolutionary theory**.

- The process by which children acquire the motives, values, and behaviors viewed as appropriate for males and females within a culture is called **gender typing**. Children develop **gender-based beliefs**, largely on the basis of **gender stereotypes**, which are reflected in **gender roles**. Children adopt a **gender identity** early in life. (See p. 476.)

Gender-Role Standards and Stereotypes

- Both within and across cultures, we find consistency in standards of desirable gender-role behavior. Males are expected to be independent, assertive, and competitive; females are expected to be more passive, sensitive, and supportive. These beliefs have changed little since the mid-1980s.

- There is, however, some variation in cultural gender-role standards both within the United States and in other cultures. Within the United States, standards vary depending on ethnicity, age, education, and occupation. For example, African American families are less likely to adhere to strict gender-role distinctions when socializing their children, whereas Mexican American families are more likely to highlight gender differences.

- Divergence between cultures is also clearly seen. However, even within groups, individual differences in the strength of stereotypes often outweigh group characteristics.

Gender Differences in Development

- Of the many traditionally held differences between the behaviors of males and females, some are real, some are found only inconsistently, and some are wholly mythical.

- Girls are more physically and neurologically advanced at birth. Boys have more mature muscular development but are more vulnerable to disease and hereditary anomalies. Girls excel early in verbal skills, but boys excel in visual-spatial and math skills. Boys' superior mathematic abilities reflect only a better grasp of geometry, however, which depends on visual-spatial abilities. Boys are more aggressive, and girls more nurturant. Boys have more reading, speech, and emotional problems than girls.

- More equivocal are gender differences in activity level, dependence, timidity, exploratory activity, and vulnerability to stress. There are no gender differences in sociability, conformity, achievement, self-esteem, or verbal hostility.

- Although differences exist, it is important to remember that the overlap between the distributions is always greater than the differences between them. In addition, noting the existence of the differences does not tell us why they exist. Clearly, girls and boys have many different experiences and opportunities as they develop, and these may either lead to divergent outcomes or highlight existing differences.

- Children develop gender-typed patterns of behavior and preferences before they are 2 years old. Girls tend to conform less strictly to gender-role stereotypes than do boys, possibly because parents and teachers exert greater pressure on boys to adhere to the masculine role. Girls may also imitate the male role because it has greater status and privilege in our culture. Although some boys and girls receive support for cross-gender behavior, most

are encouraged to behave according to traditional stereotypes.

- Gender-typed interests tend to remain stable from childhood to maturity. However, gender roles fluctuate across the life course as adults change to meet the demands of new situations and circumstances, such as child-rearing. When they become parents, women tend to show more **expressive characteristics** and men more **instrumental characteristics**.

Biological Factors in Gender Differences

- Biological factors that are thought to shape gender differences include hormones and lateralization of brain function. Hormones may organize a biological predisposition to be masculine or feminine during the prenatal period, and the increase in hormones during puberty may activate that predisposition. In addition, social experiences may alter the levels of such hormones as testosterone.

- Gender differences in the brain's organization may be reflected in the greater lateralization of brain functioning in males, which may help explain male success at spatial tasks. It may also explain female tendencies to be more flexible than males and to better withstand injury to the brain.

- Exceptionally high prenatal androgen levels in females may be correlated with greater visual-spatial skills later on. Environmental factors also influence both sexes' development of traditional and nontraditional gender-based abilities and interests.

Cognitive Factors in Gender Typing

- Cognitive factors in children's understanding of gender and gender stereotypes may contribute to their acquisition of gender roles. Kohlberg's three-stage **cognitive developmental theory of gender typing** suggests that children begin by categorizing themselves as male or female, then feel rewarded by behaving in gender-consistent ways. To do this, they must develop gender identity, **gender stability**, and **gender constancy**.

- **Gender-schema theory** suggests that children need only basic information about gender to develop mental schemas that help them organize their experiences and form rules concerning gender. Some children are more "gender schematic" than others.

Influence of the Family on Gender Typing

- Families play an active role in gender-role socialization in the way they organize their children's environment. They dress boys and girls differently, give them different toys to play with, and furnish their bedrooms differently. In addition, parents— especially fathers—treat girls and boys differently. Parents tend to see boys as stronger, even at birth, and to treat them more roughly and play with them more actively than with girls. As children grow older, parents protect girls more and allow them less autonomy than boys. Parents also expect boys to achieve more than girls in the areas of mathematics and careers.

- Because the father plays such a critical role in the development of children's gender roles, his absence may be related to disruptions in gender typing. Father's absence has been associated with teenage daughters' early sexual activity and pregnancy. The earlier in her life that a girl's father becomes absent, the higher her risks for both of these conditions. There is no evidence of differences in the gender roles of boys and girls raised in gay or lesbian families. Most children in these families grow up to have heterosexual orientations.

- Siblings can have an important impact on each other's gender socialization. Younger siblings tend to model their older siblings' behaviors; in addition, the sex of the older sibling may determine the character of his or her play with a younger sibling. This situation can result in the younger sibling's development of more or less stereotypical gender-role concepts.

Extrafamilial Influences on Gender Roles

- Many extrafamilial influences affect gender-role typing. Male and female roles are portrayed in gender-stereotypic ways in many children's books and on television. Males are more likely than females to be portrayed as aggressive, competent, rational, and powerful in the work force. Females are more often portrayed as involved primarily in housework or caring for children.

- Females are less likely to be leading characters on TV, and male characters are overrepresented in children's books—although some change toward greater equality has occurred in recent years. Children who are heavy TV viewers hold more gender-stereotyped views. A few attempts to use television to change gender stereotypes have been successful, but the effects typically have been modest and short-lived.

- Peers also serve as an important source of gender-role standards. Children are likely to react when other children violate gender-typical behaviors, and boys' cross-gender behaviors are especially

likely to meet with negative reactions from peers. Reactions from peers typically result in changes in behavior, particularly if the feedback is from a child of the same sex. This pattern of responsiveness may lead to gender segregation, which in turn provides opportunities to learn gender-typical roles. In **self-socialization**, children spontaneously adopt gender-appropriate behavior.

- Teachers also treat girls and boys differently. Because schools emphasize quiet and conformity to rules, girls tend to like school better and perform better than boys in the early grades. Even in preschool, teachers, who often react to children in gender-stereotypic ways, tend to criticize boys more than girls. If young boys perceive school as gender inappropriate, they may be less motivated to participate in school activities. This may in part explain the higher rate of learning problems found in boys in the early grades. The kinds of conforming and dependent behaviors encouraged in girls may be detrimental to their later academic success.

Sexual Orientation and Identity

- Most adolescents develop a heterosexual orientation, but a small minority identify themselves as gay, lesbian, or bisexual. Awareness of gender preferences may begin in early childhood or be delayed until adolescence. The identity process involves several steps, from initial questioning of one's sexual identity to a final phase of identity integration.

- Disclosure is often accompanied by initial negative reactions from family and friends, but varies by ethnicity and religious beliefs.

- Genetic and hormonal factors, as well as family influences, may contribute to the development of same-sex preferences.

Androgyny

- Most people are not strictly feminine or masculine but possess both masculine and feminine characteristics. Children who are more **androgynous** make less stereotyped play and activity choices. Children who have masculine or androgynous characteristics are likely to have higher self-esteem than those who have traditionally feminine characteristics.

- Children of nonconventional parents who place a high value on gender egalitarianism are less gender typed in their beliefs about possible occupations for males and females, although they are no different from other children on play preferences and knowledge of cultural sex typing. Such children are **multischematic** (see p. 501 for this term), holding more than one gender schema for responding to the world. Research interventions and the experience of nontraditional preschools clearly indicate that children's gender stereotypes can be modified or eliminated.

EXPLORE AND DISCUSS

1. Girls and boys exhibit different levels of achievement in mathematics and computer-related activities. Do you believe that these differences are biologically based or the result of various cultural influences? How would you propose to equalize male and female skills and achievement in these areas?

2. Do you think girls and boys should go to same-sex schools, or do you think coed schools are better for children's learning? Explain your answer.

3. Parents, peers, schools, and the media all influence gender roles. Do you think one or more of these factors are more important than the others for children's learning of these roles? Or do you think each influence affects a particular aspect of gender-role learning? If so, which aspect does each impact?

Illustration in the border of a page of Latin text from the Luttrell Psalter: *A boy stealing cherries from a tree.* c. 1300–c. 1340.

British Library, London.

14.

Morality, Altruism, and Aggression

Anyone who spends time observing children on the playground must be impressed by the great diversity of children's behavior. Some children play together cooperatively, help or share with others, and try to soothe classmates who have broken toys or scraped knees. Other children are involved in one altercation after another—successive bouts of name calling, quarreling, shoving, and pushing, with occasional bursts of more violent physical fighting. You can also watch children during an exam; some are whispering or peeking surreptitiously at a neighbor's exam paper or stealthily slipping out notes concealed in their desks. Others sit with their brows furrowed in focused attention, trying to solve the problems on the exam.

What contributes to such marked variations in children's behavior toward one another and in their apparent attitudes toward ethical issues? How do moral values and behaviors develop in the young child? How does the child become capable of self-control, resistance to temptation, and personal sacrifices for the welfare of others? This chapter traces the course of moral development, the evolution of altruistic behavior, and the development and control of aggression. We begin by discussing two of the most important theories of moral development—those of Jean Piaget and Lawrence Kohlberg. We examine the relationship between moral judgment and moral actions and the consistency of these behaviors across situations and over time. We then explore the development of prosocial and altruistic behaviors, asking how early these behaviors appear, how they change, and how parents influence them. Finally, we consider the topic of aggression, raising a number of issues: How does aggression develop? How does it change in form and frequency? How do biological and environmental factors influence the development of aggressive behaviors? How can we control aggression most effectively?

AN OVERVIEW OF MORAL DEVELOPMENT

In every culture, one of the most basic tasks of socialization is communicating ethical standards to the developing child and shaping and enforcing the practice of "good" behaviors. Although the specific values and behaviors regarded as desirable vary among cultures, every society has a system of rules about the rightness and wrongness of certain behaviors. Adults expect children to learn these rules and to experience satisfaction when conforming to them and emotional discomfort or guilt when violating them.

Initially, parents control the young child's behavior largely through immediate external factors, such as displeasure or punishment. As children mature, however, they begin to regulate their own behavior by means of internalized standards of conduct. They become able, in the absence of external restraints, to exert self-control. Through *internalization*, children incorporate others' ideas and beliefs into their own concepts of themselves, thus developing personal standards of conduct. Many psychologists argue that internalization is the fundamental and essential process in the development of morality.

Psychological research has focused on the development of three basic aspects of morality: cognitive, behavioral, and emotional. The cognitive component involves knowledge of ethical rules and judgments of the "goodness" or "badness" of various acts. The behavioral component refers to people's actual behavior in situations that invoke ethical considerations. The emotional component focuses on people's feelings about situations and behaviors that involve moral and ethical decisions. As we will see, these same three components help us understand the development of altruism and of aggression.

empathy The capacity to experience the same emotion that someone else is experiencing.

In general, studies of moral behavior in children have investigated activities that most adults consider wrong, such as lying or cheating and failing to delay gratification, to resist temptation, or to control aggressive behavior. More recently, researchers have studied positive behaviors, such as sharing, helping, cooperating, and performing prosocial or altruistic acts. Studies of the emotional dimension of morality have also traditionally focused on negative aspects, such as feelings of guilt after a transgression, but more recent work has focused on positive emotions such as **empathy** for other people's misfortunes or distress (Eisenberg et al., 2006). The particular theory a researcher embraces generally determines the specific aspect of moral development that he or she explores. Cognitive theories drive investigations of moral judgments, learning theories provide the underpinning for studies of ethical behavior, and psychoanalytic theories underlie examinations of the affective components of morality.

COGNITIVE THEORIES OF MORAL DEVELOPMENT

Jean Piaget and Lawrence Kohlberg offered explanations for the acceptance and development of moral standards. Piaget's explanations involved many of his principles and processes of cognitive growth we discussed in Chapter 8. Indeed, both Piaget and Kohlberg considered moral development essentially an aspect of cognitive development.

Jean Piaget's Cognitive Theory of Moral Development

Piaget proposed a cognitive developmental theory of moral development in which the child's moral concepts evolve in an unvarying sequence through three stages. The first, *premoral stage* lasts until about the age of 5; the *stage of moral realism* lasts from about

6 to about 10 years of age; and the third stage of *morality of reciprocity,* or *autonomous morality,* lasts from age 11 onward. One cannot reach the stage of moral reciprocity without first passing through the stage of moral realism. According to Piaget, mature morality includes both an understanding and acceptance of social rules and a concern for equality and reciprocity in human relationships; these qualities form the basis of justice. Piaget investigated children's developing moral judgment in two main ways: by studying how children change their attitudes toward rules in common games and by examining the way they change their judgments of the seriousness of transgressions over time.

LEARNING THE RULES OF MORAL BEHAVIOR   Preschool children are in the **premoral stage**; they show little concern for, or awareness of, rules. In games like marbles, they don't try to play systematically with the intention of winning but seem rather to gain satisfaction from manipulating the marbles and finding out how they can be used in different ways. By the time they are 5, however, children move into the stage of **moral realism**, in which they develop great concern and respect for rules that come from authority, usually their parents, and see rules as immutable—unchanging and not to be questioned. In this stage, what Piaget calls *moral absolutism* prevails. If we ask children of this age if children in other countries could play marbles with different rules, they will assure us that they could not. We see a similar rigidity in the way children approach social interactions, frequently falling back on a "my mommy says" ploy to solve disputes.

In addition, young children subscribe to the notion of **immanent justice**: They see any deviation from the rules as inevitably resulting in punishment. Someone or something is going to get you, one way or another! Such retribution might take the form of accidents or mishaps controlled by inanimate objects or by God. A child who has lied to her mother may later fall off her bike, skin her knees, and think, "That's what I get for lying to mom." In this stage, children also evaluate the seriousness of an act solely in terms of its consequences; they don't take the perpetrator's intentions into account. The two factors that contribute to young children's moral realism are their *egocentrism*—their inability to subordinate their own experiences and to perceive situations as others may—and their *immature way of thinking*, which leads them to confuse external reality with their own thought processes and subjective experiences.

premoral stage Piaget's first stage of moral development, in which the child shows little concern for rules.

moral realism Piaget's second stage of moral development, in which the child shows great respect for rules but applies them quite inflexibly.

immanent justice The notion that any deviation from rules will inevitably result in punishment or retribution.

Children, like these Moroccan boys, often learn the meaning of rules by playing formal games. The games they learn and the ways in which they establish and change rules may vary across different cultures.

Piaget argues that a **morality of reciprocity** begins to emerge in older children at about the age of 11. Children's moral judgments are now characterized by the recognition that social rules are arbitrary agreements that can be questioned and changed. They realize that obedience to authority is neither necessary nor always desirable and that violations of rules are not always wrong or inevitably punished. In judging another's behavior, children consider the other's feelings and viewpoint. In this stage, children believe that if behavior is to be punished, the punishment should be related to both the wrongdoer's intentions and the nature of the transgression. The punishment, the child thinks, should also be of such a nature that it somehow makes up for the harm done or helps teach the wrongdoer to behave better in the future. Children in this stage also believe in "equalitarianism;" that is, they believe that there should be equal justice for all.

Some of the shifts in attitude from the stage of moral realism to the stage of moral reciprocity are vividly illustrated in Piaget's account of his investigations, *The Moral Judgment of the Child* (1932). Piaget would read paired stories to a child and then ask the child if the children in each story were equally guilty, which child was the naughtier, and why.

> *Story I.*
>
> A little boy who is called John is in his room. He is called to dinner. He goes into the dining room. But behind the door there [is] a chair, and on the chair there [is] a tray with 15 cups on it. John couldn't have known that there was all this behind the door. He goes in, the door knocks against the tray, "bang" to the 15 cups and they all get broken!
>
> *Story II.*
>
> Once there was a little boy whose name was Henry. One day when his mother was out he tried to get some jam out of the cupboard. He climbed up on a chair and stretched out his arm. But the jam was too high up and he couldn't reach it and have any. But while he was trying to get it, he knocked over a cup. The cup fell down and broke. (Piaget, 1932, p. 122)

Clearly, Henry tried to deceive his mother. But the child in the stage of moral realism regards John as less ethical because he broke more cups, even though John's act was an accident and unintentional.

EVALUATION OF PIAGET'S THEORY   How well has Piaget's theory fared since 1932? In industrialized Western countries such as the United States, Great Britain, France, and Switzerland, across a wide range of populations and social classes, and among both genders, investigators find regular age trends in the development of moral judgment from moral realism to moral reciprocity. However, the findings in other cultures are less consistent. For example, Havighurst and Neugarten (1955) found that among the people of ten Native American tribes, the belief in immanent justice increased rather than decreased over time. Also, only two of the ten groups showed the predicted shift toward greater flexibility in the conception of rules with age.

Although research on moral development lends support to the general developmental sequence, it also suggests that Piaget underestimated the cognitive capacities of young children. In judging the behavior of others, even 6-year-old children are able to consider an actor's intentions when the situation is described in a way they can comprehend. For example, when Chandler et al. (1973) presented stories to 6-year-olds by videotape rather than orally, the younger children responded to the intentions of the actors as well as older children did. Viewing the scenarios probably helps younger children by providing them with more information, such as facial expressions that signal emotional states; these additional clues can help younger ones better infer the actor's intentions.

Another methodological shortcoming in Piaget's early studies may help account for his underestimation of young children's ability to make moral judgments. Piaget always mixed action outcome with actor intention. Thus, he invariably required children to judge whether a child who causes a small amount of damage in the service of bad intentions is "worse" than a child who causes a large amount of damage but has good

intentions. When researchers present stories in which good and bad intentions can be evaluated separately from good and bad outcomes, even elementary school-age children use intentions as a basis for judgment (Bussey, 1992; Helwig et al., 2001). For example, if the case of the broken cups is presented with a focus on intention (the child breaks cups *trying to help his mother* or *trying to sneak a cookie*), but the outcome is the same for all stories (the child breaks six cups), children have no trouble understanding the role of intention. By cleverly creating variations on these basic stories, researchers have been able to isolate factors that affect moral judgment. Just as in real life, many issues influence children's judgments about rightness and wrongness and about whether or not the consequences of actions are positive or negative and whether the consequences are intended or accidental (Helwig, 2008).

The "simple" tasks that Piaget devised have become much more complicated today! Clearly, there are many more factors to consider in understanding moral reasoning than simply intentions and consequences. In the next section, we will see that Kohlberg has offered a more complex approach to the study of moral judgment.

Lawrence Kohlberg's Cognitive Theory of Moral Development

Kohlberg (1969, 1985) based his theory of moral development on Piaget's theory, but he refined and expanded the stages and extended the age periods covered. Like Piaget, Kohlberg believed that the child's cognitive capabilities determine the evolution of moral reasoning and that moral development builds on concepts grasped in preceding stages.

To test his theory, Kohlberg began by interviewing boys between the ages of 10 and 16, presenting them with a series of moral dilemmas in which they had to choose either to obey rules and authority or to ignore them and respond to the needs and welfare of other people. Here is a representative story presented to Kohlberg's young participants.

> Heinz needs a particular expensive drug to help his dying wife. The pharmacist who discovered and controls the supply of the drug has refused Heinz's offer to give him all the money he now has, which would be about half the necessary sum, and to pay the rest later. Heinz must now decide whether or not to steal the drug to save his wife; that is, whether to obey the rules and laws of society or to violate them to respond to the needs of his wife. What should Heinz do, and why?

On the basis of his findings, Kohlberg formulated a series of three broad levels of moral development and subdivided these into six stages. Each stage was based not only on participants' choices of either an obedient or a need-serving act but on the reasons participants gave and on the ways they justified their choices. Table 14-1 presents these levels and stages of moral development. Kohlberg argued that although the sequence of all six stages is fixed—that is, all people pass through the stages in the same order—they may occur in different people at different ages. Moreover, many people never attain the highest level of moral judgment, and even some adults continue to think in immature terms.

Kohlberg saw behavior at the **preconventional level** as based on the desire to avoid punishment and gain rewards (see Table 14-1, Level I). At Level II, the **conventional level**, although children identify with their parents and conform to what they regard as right or wrong, what they have internalized is the motive to conform, not the notion of ethical standards. It is only at Level III, the **postconventional level**, that moral judgment is rational and internalized and that conduct is controlled by an internalized ethical code that is relatively independent of others' approval or castigation. At this level, moral conflict is resolved in terms of broad ethical principles, and violating these principles results in guilt and self-condemnation.

In Kohlberg's studies (Colby & Kohlberg, 1987; Kohlberg, 1985), young children gave more preconventional (Level I) responses, and older children gave more postconventional

preconventional level Kohlberg's first level of moral development, in which he sees the child's behavior as based on the desire to avoid punishment and gain rewards.

conventional level Kohlberg's second level of moral development, in which the child's behavior is designed to solicit others' approval and maintain good relations with them. The child accepts societal regulations unquestioningly and judges behavior as good if it conforms to these rules.

postconventional level Kohlberg's third level of moral development, in which the child's judgments are rational and his conduct is controlled by an internalized ethical code that is relatively independent of the approval or disapproval of others.

Table 14-1

Kohlberg's theory of moral development

Level I Preconventional Morality	
Stage 1	
Obedience and punishment orientation	To avoid punishment, the child defers to prestigious or powerful people, usually the parents. The morality of an act is defined by its physical consequences.
Stage 2	
Naive hedonistic and instrumental orientation	The child conforms to gain rewards. The child understands reciprocity and sharing, but this reciprocity is manipulative and self-serving rather than based on a true sense of justice, generosity, sympathy, or compassion. It is a kind of bartering: "I'll lend you my bike if I can play with your wagon." "I'll do my homework now if I can watch the late night movie."
Level II Conventional Morality: Conventional Rules and Conformity	
Stage 3	
Good boy morality	The child's good behavior is designed to maintain approval and good relations with others. Although the child is still basing judgments of right and wrong on others' responses, he is concerned with their approval and disapproval rather than their physical power. It is to maintain goodwill that he conforms to families' and friends' standards. However, the child is starting to accept others' social regulations and to judge the goodness or badness of behavior in terms of a person's intent to violate these rules.
Stage 4	
Authority and morality that maintain the social order	The person blindly accepts social conventions and rules and believes that if society accepts these rules, they should be maintained to avoid censure. He now conforms not just to other individuals' standards but to the social order. This is the epitome of "law and order" morality, involving unquestioning acceptance of social regulations. The person judges behavior as good according to whether it conforms to a rigid set of rules. According to Kohlberg, many people never go beyond this conventional level of morality.
Level III Postconventional Morality: Self-Accepted Moral Principles	
Stage 5	
Morality of contract, individual rights, and democratically accepted law	People now have a flexibility of moral beliefs they lacked in earlier stages. Morality is based on an agreement among individuals to conform to norms that appear necessary to maintain the social order and the rights of others. However, because this is a social contract, it can be modified when people within a society rationally discuss alternatives that might be more advantageous to more members of the society.
Stage 6	
Morality of individual principles and conscience	People conform both to social standards and to internalized ideals. Their intent is to avoid self-condemnation rather than criticism by others. People base their decisions on abstract principles involving justice, compassion, and equality. This is a morality based on a respect for others. People who have attained this level of development will have highly individualistic moral beliefs that may at times conflict with rules accepted by the majority of a society. According to Kohlberg, among the nonviolent, activist students who demonstrated in the mid to late 1960s against the Vietnam War, more had attained the postconventional level of morality than had nonactivist students.

Source: Kohlberg, 1969.

responses (Figure 14-1). Although as we've said, Kohlberg predicted no specific level of response at any particular age, the general sequence of stages was followed in these participants' responding. The sequence should be invariant across cultures, Kohlberg asserted, although the ultimate level attained may vary among cultures and for individuals within the same society. Once a person has attained a high level of moral cognition, especially Stage 6, he or she will not regress and go back to earlier stages.
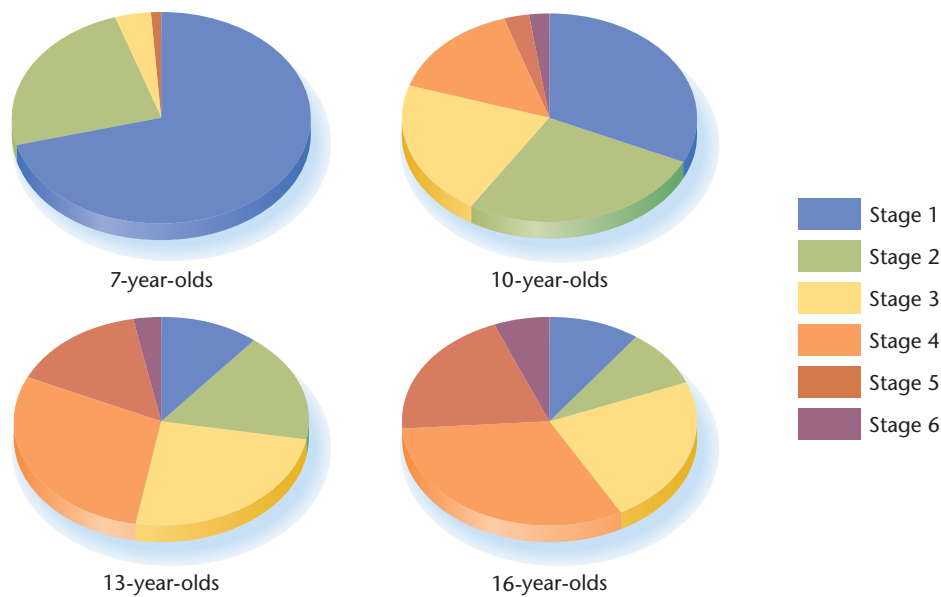
Figure 14-1

Use of Kohlberg's six stages of moral reasoning and judgment

Most 7-year-olds responded at Level I (Stages 1 and 2), although a very few offered some Level III (Stage 5) responses. The 10-year-olds showed the most regular pattern: In descending order of frequency, they gave Stages 1, 2, 3, 4, 5, and 6 responses! Among 16-year-olds, the most common responses were at Level II (Stages 3 and 4). Quite a few participants in this age group responded at Level III (Stages 5 and 6), but there were also some Level I responses.

MORAL DEVELOPMENT IN GIRLS AND WOMEN   Have you noticed that the participants in Kohlberg's studies were boys, not girls? A lot of women have! Feminists contend that Kohlberg's theory was biased against females. Carol Gilligan, the foremost spokesperson for this view, argued eloquently in her book *In a Different Voice* (1982) that Kohlberg failed to take account of possible differences in the moral orientations of females and males. Citing the fact that women usually score lower than men on Kohlberg's tests, Gilligan (1982) pointed out that "the very traits that traditionally have defined the 'goodness' of women are those that mark them as deficient in moral development" (p. 18). Researchers have rated most women's moral judgments on these tests at Stage 3, the stage in which morality is conceived in terms of goodness and badness. In this stage, the person is motivated primarily to maintain the goodwill and approval of others, although she or he is beginning to accept the notion of social regulations and to judge behaviors in terms of whether people conform to or violate these rules.

According to Gilligan, Kohlberg's theory, based as it was on the study of boys and men only, fails to account for gender-based differences. For example, women tend to take a more caring and interpersonal approach to moral dilemmas, whereas men tend to emphasize less clearly personal values such as individual rights and principles of justice. Consider how two children—a boy and a girl—responded to the question, Should Heinz steal the drug to save his wife's life?

Jake, age 11:

For one thing, a human life is worth more than money, and if the druggist only makes $1,000, he is still going to live, but if Heinz doesn't steal the drug, his wife is going to die. [Why is life worth more than money?] Because the druggist can get a thousand dollars from rich people with cancer, but Heinz can't get his wife again. [Why not?] Because people are all different and so you couldn't get Heinz's wife again. (Gilligan, 1982, p. 26)

Jake's response emphasizes logic and the balance between life and property rights, according to Gilligan, a masculine orientation.

Amy, age 11:

Well, I don't think so. I think there might be other ways besides stealing it, like if he could borrow the money or make a loan or something, but he really shouldn't steal the drug—but his wife shouldn't die either. If he stole the drug, he might save his wife then, but if he did, he might have to go to jail, and then his wife might get sicker again, and he couldn't get more of the drug, and it might not be good. So, they should really just talk it out and find some other way to make the money. (Gilligan, 1982, p. 28)

BOX 14-1

Perspectives on Diversity

JUSTICE VERSUS INTERPERSONAL OBLIGATIONS: INDIA AND THE UNITED STATES

The debate about the significance of a caring and interpersonal perspective for a model of moral reasoning may have broader implications than Gilligan foresaw when she first challenged Kohlberg's model of moral development. Cross-cultural research that has pitted interpersonal obligations against justice obligations has revealed significant differences between American and Hindu Indian children (Baron & Miller, 2000; Miller & Bersoff, 1992). Whereas more than four fifths of Indian children and adults endorsed interpersonal considerations in judging moral dilemmas, little more than a third of U.S. schoolchildren and adults did.

Kohlberg's model is based on a philosophical tradition that sees obligations to care for others as subordinate to obligations based on justice, fairness, the Golden Rule. Concerns for the welfare of others are matters of interpersonal responsibility and personal choice. In Miller's research, American children indicated they believe that only justice obligations, and not helping behavior, should be rule governed. Hindu Indian children and adults saw helping others as fully moral—that is, as involving a sense of objective obligation and as being within the scope of legitimate regulation.

Comparing groups of third- and seventh-grade children and college-age adults in New Haven, Connecticut, and in Mysore, a city in southern India, Miller and her colleagues asked participants first to rate the undesirability of single incidents in which people were described as breaching either justice or interpersonal obligations. In this phase of the study, the researchers endeavored to adjust their examples so as to ensure that participants considered all incidents of the same or nearly the same degree of importance. In the second phase of the study, the researchers presented participants with fully described conflict situations in which the respondents could fulfill one kind of behavioral obligation (justice or interpersonal) only by violating the other. Here is one of the conflict situations presented to American participants.

> Ben was in Los Angeles on business. When his meetings were over . . . Ben planned to travel to San Francisco . . . to attend his best friend's wedding. He needed to catch the very next train if he was to be on time for the ceremony, as he had to deliver the wedding rings. However, Ben's wallet was stolen in the train station. He lost all of his money as well as his ticket to San Francisco . . . . He approached several officials and passengers . . . and asked them to loan him money to buy a new ticket. But . . . no one was willing to lend him the money he needed. While Ben was sitting on a bench trying to decide what to do next, a well-dressed man sitting next to him walked away for a minute . . . . Ben noticed that the man had left his coat unattended. Sticking out of the man's coat pocket was a train ticket to San Francisco. Ben knew that he could take the ticket and use it to travel to San Francisco on the next train. He also saw that the man had more than enough money in his coat pocket to buy another train ticket.

In this example, participants were asked to decide which of the following two alternative actions Ben should choose:

1. *Ben should not take the ticket from the man's coat pocket*—even though it means not getting to San Francisco in time to deliver the wedding rings to his best friend.

2. *Ben should go to San Francisco to deliver the wedding rings to his best friend*—even though it means taking the train ticket from the other man's coat pocket.

As Figure 14-2 shows, Indian participants at all age levels were more than twice as likely to decide in favor of interpersonal alternatives as were American partici-

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Instead of focusing on the issues of property or law, Amy focuses on the impact the theft might have on Heinz, his wife, his wife's condition, and their relationship—an interpersonal orientation to morality.

Others have found support for Gilligan's claim of separate moral orientations for males and females. Walker and colleagues (1987) found that when they asked adults to recall real-life dilemmas (e.g., birth control, abortion, the preservation of life, the inequitable character of a will), women were more likely to express a caring orientation, whereas men more often adopted a "rights" orientation. Women were also more likely to recall dilemmas that concerned personal relationships, whereas men recalled
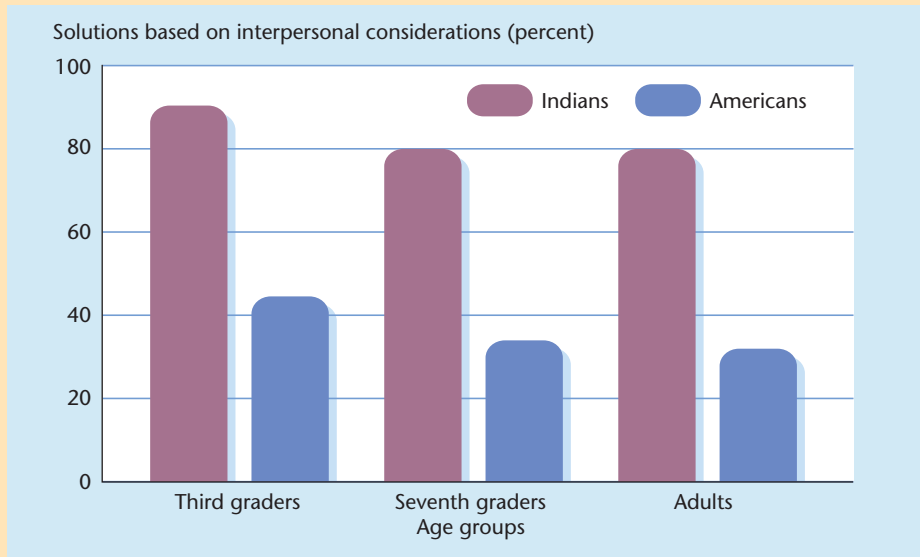
Figure 14-2

Moral dilemmas and interpersonal-versus-justice considerations

In every age group, Indians were far more likely than Americans to cite interpersonal considerations in choosing solutions to moral dilemmas.

Source: Based on Miller & Bersoff, 1992.

pants. The more serious the breach of an obligation, the more likely Hindu Indians were to switch to a justice choice, but even in these circumstances, Indians clearly preferred the interpersonal alternatives. Indians also tended to categorize their recommendations as moral imperatives whether they opted for justice or interpersonal alternatives. Americans, however, tended to describe an interpersonal alternative as a personal-moral or personal-choice decision. When Americans and Indians considered life-threatening situations, they both viewed helping others as moral issues; they disagreed, however, when the dilemmas were less extreme. It seems that Indians tend to view helping others in fully moral terms no matter how minor the issue, a view more compatible with the one Gilligan originally proposed as more "feminine."

Kohlberg's model specifies that at Stage 6, "individuals conform both to social standards and to inter-nalized ideals [and] . . . make decisions that are based on abstract principles that include compassion . . . [evidencing] a morality that is based upon a respect for others" (see Table 14-1). This formulation certainly does not seem to rule out so-called interpersonal concerns. Moreover, as we have noted in the text, many researchers who have used Kohlberg's model have failed to find the gender differences that early research detected. The Hindu religion holds that all life is sacred, and Hindu Indian culture emphasizes "social duties as the starting point of society" (Miller & Bersoff, 1992, p. 552). These views are not greatly different from those many in Western society have attributed to a feminine perspective. It seems likely that caring and interpersonal moral reasoning are not feminine but rather a view of morality that differs from a moral perspective based on the concept of justice and individual rights.

more impersonal kinds of dilemmas. Interestingly, when men and women were asked to respond to the same real-life dilemmas, both men and women focused more on caring than justice (Walker, 1995). Other studies using both hypothetical and real-life situations have yielded no clear pattern of gender differences (Jaffe & Hyde, 2000; Turiel, 2006).

Although there is some basis for Gilligan's contention that there may be different orientations to morality, we have little evidence of a gender bias in moral reasoning (Turiel, 2006). Reviewing data from more than 10,000 research participants, Walker (1988, 2006) found little support for the notion that females and males differ in the levels of their moral judgments. At the same time, Gilligan (1993) argues that the caring

and interpersonal perspective should be added to the understanding of moral reasoning in all people. Moreover, evidence from neural-imaging studies suggests that different parts of the brain may be involved in decision making about issues of justice and care regardless of gender (Robertson et al., 2007). Interestingly, this view has received some support from cross-cultural studies. Consider, for example, the research described in Box 14-1.

EFFECTS OF SOCIAL INTERACTIONS ON MORAL DEVELOP- MENT Kohlberg emphasized the importance for the child's moral development of social interactions that involve role taking, and following his lead, researchers devised educational programs to foster the development of moral judgment. Designed for class-room use, these programs focused on peer discussion of controversial moral issues and practice exploring solutions to moral dilemmas and negotiating with others. These educational interventions did foster moral judgment and promote closer links between judgments and behavior (Youniss & Yates, 1997).

Children's moral judgments are also advanced when their parents use consistent disciplinary techniques that involve reasoning and explanation, when they initiate discussion of the feelings of others, and when they promote a democratic family-discussion style (Hoffman, 1984, 2000; Parke, 1977; Walker et al., 2000).

Children's understanding of moral rules begins at a very early age. Observing family interactions, Judy Dunn (1987, 1989) and her colleagues found that children showed the beginnings of moral understanding and rapid increases in understanding between the ages of 2 and 3. As early as 16 months, mothers and children engaged in "moral dialogues" about rules, with children often nodding, shaking their heads, or providing verbal answers to their mothers' inquiries about rules.

> **Ella (21 months):** [At table, throws toy to floor, a previously forbidden act. Looks at mother.]
>
> **Mother:** No! What's Ella?
>
> **Child:** Bad bad baba.
>
> **Mother:** A bad bad baba.

By 36 months, in nearly a third of their disputes, children produced justifications for their actions. These justifications might invoke the child's own wants, needs, or feelings ("But, I need that."), a social rule ("That doesn't belong to you."), the feelings of another ("Rachel will be cross if you do that."), or consequences of actions ("You'll break it if you do that.").

EVALUATION OF KOHLBERG'S THEORY Kohlberg's theory of moral judgment received more empirical support than Piaget's. The notion that children proceed through the stages of moral judgment in an invariant fashion received general support (Rest et al., 2000; Turiel, 2006; Walker et al., 2001). In one study, participants were asked to make judgments about moral dilemmas over a 20-year period (Colby et al., 1983). All but two participants moved from lower to higher stages, and no one skipped stages. Although the vast majority stopped at Stage 4, a few (10%) continued to develop their moral reasoning in their 20s, reaching Stage 5 in young adulthood (Figure 14-3). None, however, reached Stage 6. The dominant pattern of moral reasoning in most adults appears to be conventional (Level II, Stage 3 or 4). In other work, participants who were exposed to a model's reasoning about a moral dilemma at a stage above or a stage below their own stage of moral development preferred the more advanced reasoning (Rest et al., 2000; Turiel, 2002, 2006).

Studies in Turkey (Nisan & Kohlberg, 1982), Taiwan (Lei & Cheng, 1989), and Israel (Snarey et al., 1985) showed that individuals, regardless of their cultural background, developed through the stage sequence in the same manner. In addition, few participants skipped a stage or regressed to a lower stage. However, there are cultural differences.
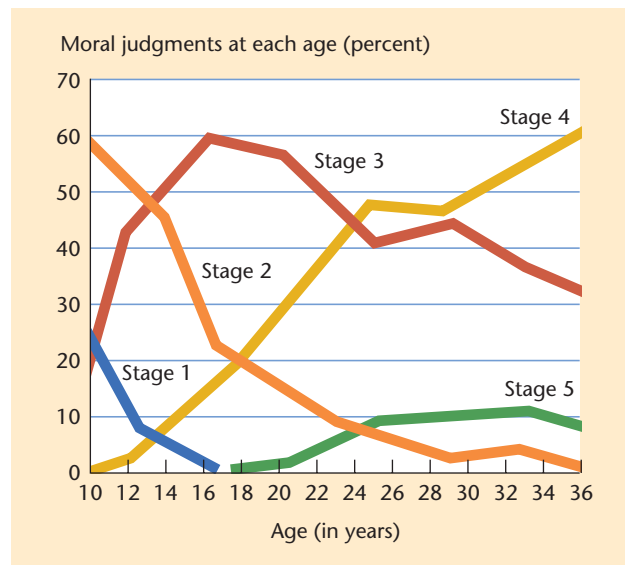
In New Guinea, people place community obligations over individual rights; in India, people emphasize the sacredness of all forms of life. As Box 14-1 suggests, Kohlberg's focus on individual rights and obligations may lead to underestimates of moral development in other cultures or may exclude some culturally unique domains of morality (Shweder et al., 1997; Snarey & Hooker, 2006; Wainryb, 2006).

People's moral judgments also differ depending on the way questions are presented. When an issue is couched in abstract form, rather than embedded in a realistic description of a particular situation or conflict, respondents are more likely to support the default position (Helwig, 2003, 2006). For example, when children were simply asked whether they endorsed freedom of speech and religion, nearly all said they did. However, when they were asked the same question in a context in which these freedoms conflicted with other liberties, such as freedom from physical and psychological harm, results were quite different. Fewer children endorsed freedom of speech. Moral judgments involve the need to balance competing moral issues, and Kohlberg's original stories oversimplified the nature of the dilemmas people face in everyday moral decision making. History also shapes people's views of morality. Events—such as the Civil Rights Movement or the 9/11 attacks on New York and Washington, D.C.—sensitize people to issues of fairness and justice (Turiel, 2002, 2006; Wainryb & Psaupathi, 2008).

In spite of criticisms and limitations, Kohlberg's pioneering work revolutionized the way we think about moral development. Due to his influence, cognitive judgment and understanding are central concerns of a contemporary approach to the issue of morality.

Distinguishing Moral Judgments From Other Social Rules

Children must learn many rules for behavior. At the same time that they learn moral rules against cheating, lying, and stealing, they learn many other **social-convention rules**: table manners, kinds of dress, modes of greeting, forms of address, and other rules of etiquette. According to Elliot Turiel (1983, 2002, 2006), children make clear distinctions between these two kinds of rules. In one study of preschool-age children, researchers asked children how wrong it would be to hit someone, to lie, or to steal (moral rules) and how wrong it would be to address teachers by their first names, for a boy to enter a girls' bathroom, or to eat lunch with one's fingers (social-convention rules) (Nucci & Turiel, 1978). Children and adolescents from second grade to college

social-convention rules
Socially based rules about everyday conduct.
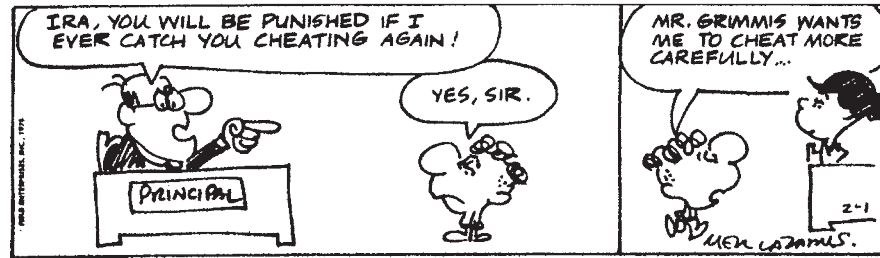
consistently viewed the moral violations as more wrong than the violations of social convention. Even children as young as 3 can distinguish moral rules from social-convention rules (Smetana & Braeges, 1990). Children view moral violations as more wrong because they result in harm to another and violate norms of justice and others' rights, whereas they see deviations from social conventions as impolite or disruptive (Turiel, 2006).

Children agree that moral issues are fixed, absolute, and invariant across cultures and that social conventions are arbitrary, relative, and vary across cultures (Helwig 2006; Turiel, 2002, 2006; Wainryb, 2006). When asked if it would be acceptable to steal in a country that had no laws against stealing, children as young as 6 thought it was wrong to steal. However, they thought that people in different countries could play games by different rules (Turiel et al., 1987). In many countries, including Brazil, India, Indonesia, Korea, Nigeria, and Zambia, children and adolescents judge moral issues differently from social-convention issues (Turiel, 2002, 2006; Wainryb, 2006).

Children's differentiation between moral and conventional rules has implications for another aspect of moral development—the development of tolerance. Children are intolerant of moral violations, but they often tolerate not only divergent social conventions but also different psychological and religious beliefs (e.g., "that the way to be really good friends with people is never to tell them how you feel about anything"; "that doing nice things for other people makes these people spoiled and selfish"; "that there are 38 gods"; or "that only people who die on Tuesday become angels") (Wainryb et al., 2001).

How do children learn to distinguish between moral and other transgressions? Children learn from their parents at a very early age that the consequences of eating your spaghetti with your hands or spilling your milk or wearing your sweater inside out are different from those of taking your brother's toy or pulling your kid sister's ponytail. Mothers of 2-year-olds responded to social-convention violations with rules about social order and social regulation that focused on the disorder that the act created ("Look at the mess you made!"). They responded to moral transgressions by focusing on the consequences of the acts for other's rights and welfare or by making perspective-taking requests ("Think how you would feel if somebody hit you!") (Smetana, 1995, 2006).

Parents influence adolescents as well as young children. Teenagers understand and accept that parents may legitimately regulate their moral behavior (Smetana 1995, 2005). They even accept some parental regulation of social-convention matters (Smetana, 2005). However, they do not agree that parents have a right to regulate personal matters such as their appearance, friendship choices, and spending decisions. Conflicts most often arise in this area, and they arise with increasing frequency as the adolescent grows older (Smetana, 2000). Conflicts that mix social-convention and personal issues—for example, cleaning one's own room—are more intense.

Other socializing agents, including teachers and peers, play a part, too. Smetana (1997) found that 2- and 3-year-olds in a child-care center reacted more emotionally and retaliated more often in the face of moral transgressions than when confronting social-convention transgressions. The 3-year-olds were likely to make statements about rights ("That's not fair," or "The rules say that you can't do that"), a major accomplishment. In sum, children can distinguish among different kinds of violations and can do so at a surprisingly early age.

Do Moral Judgments Always Lead to Moral Behavior?

The maturity of the child's moral judgment does not necessarily predict how the child will actually behave; moral judgment and moral behavior are often unrelated, especially in young children (Blasi, 1983; Straughan, 1986). Often, children's behavior is impulsive and not guided by rational and deliberate thought (Burton, 1984; Walker, 2004). A child may have reached Kohlberg's Stage 3, the level of "good girl morality," and be concerned with maintaining parental approval. She may even be able to tell a researcher that it is wrong to hit young children because they do not really know what they're doing (Batson & Thompson, 2001). However, when her younger brother breaks her favorite toy, she may kick him, even if her mother is watching. Thought does not always guide action!

In older children and adults, moral judgments and moral behavior are more likely to be linked (Kochanska et al., 2002). People who have reached Kohlberg's Level III (Stages 5 and 6) are less likely to cheat than those at lower levels, less likely to inflict pain on others, and more likely to endorse free speech and due process and to oppose capital punishment (Gibbs et al., 1995; Judy & Nelson, 2000; Kohlberg & Candee, 1984). Nevertheless, as we noted earlier, relatively few people may reach Stage 6 in Kohlberg's moral hierarchy. There are relatively few towering moral figures such as Martin Luther King Jr. or Mother Teresa among us.

Rest et al. (2000) proposed a four-step process involved in executing a moral action (this process is reminiscent of Dodge's information-processing approach to social interaction that we discussed in Chapter 12). In Step 1, the child interprets the situation in terms of how other people's welfare could be affected by his or her possible actions. In Step 2, the child figures out what the ideally moral course of action would be, given the possibilities in Step 1. In Step 3, the child decides what to do, and finally, in Step 4, the child actually performs the action chosen. So far, we have considered Steps 1 and 2; in the next section, we explore Steps 3 and 4.

THE BEHAVIORAL SIDE OF MORAL DEVELOPMENT

In this section, we focus on the action, or behavioral, component of moral development—deciding what to do and doing it.

Self-Regulation and the Delay of Gratification

One goal in socializing children is to help them achieve **self-regulation**, or the ability to control behavior on their own, without reminders from others. For moral development, children must also learn to inhibit or direct their actions to conform to moral rules. Life is full of temptations, traps, and tugs that pull young children away from moral courses of action. Children's ability to resist these forces is a consequence of both their own emerging cognitive and representational capacities and the guidance that parents, siblings, and other socializing agents provide.

How does this capacity to monitor and regulate one's own behavior develop? According to Kopp (1982, 2002), it begins with a **control phase**, when 12- to 18-month-old children first initiate, maintain, modulate, or cease acts when an adult makes a demand. In this phase, children are highly dependent on the caregiver for reminder signals about acceptable behaviors. In the **self-control phase**, children gain the ability to comply with caregiver expectations in the absence of external reminders. Presumably, this is because the development of representational thinking and recall memory permits these

self-regulation The child's ability to control behavior on her own without reminders from others.

control phase According to Kopp, the first phase in learning self-regulation, when children are highly dependent on caregivers to remind them about acceptable behaviors.

self-control phase According to Kopp, the second phase in learning self-regulation, when the child becomes able to comply with caregiver expectations in the absence of the caregiver.

self-regulation phase
According to Kopp, the third phase in learning self-regulation, when children become able to use strategies and plans to direct their own behavior and to delay gratification.

delay gratification To put off until another time possessing or doing something that gives one pleasure.

This boy may be trying to guess what's in the packages or just itching to start tearing off the paper—or both! Learning to delay gratification is a significant part of self-regulation.

conscience The child's internalized values and standards of behavior.

children to remember family rules and routines. In the **self-regulation phase**, children become able to use strategies and plans to direct their behavior and to help them resist temptation and to **delay gratification**. Kopp demonstrated these developmental changes by showing children attractive objects such as a toy telephone and telling them not to touch the objects right away. Children who were 18 months old were able to wait only 20 seconds, 24-month-olds waited 70 seconds, and 30-month-olds waited nearly 100 seconds before touching the attractive but forbidden object (Vaughn et al., 1984). Kopp and other researchers extended the study of self-regulation through the preschool period and confirmed the progression in self-control (Kochanska et al., 2001; Kopp, 2002).

Although all children progress from control by others through self-control to self-regulation, some progress more rapidly and achieve higher levels of control than others. Some children reach the self-regulation phase by 4 or 5 years of age, whereas others continue to rely on adult control to comply with rules. Children who are self-regulators have a stronger sense of "moral self"; they endorse and internalize parental values and rules, and they make conscious efforts to control their behavior, even when it requires giving up or postponing pleasurable outcomes (Kochanska, 2002; Kochanska et al., 2001). When they were infants, self-regulators were better at inhibiting their actions.

The development of self-control is also promoted by the actions of parents and other caregivers. Consistent and carefully timed punishment, as well as the provision of a rationale for compliance, helps increase children's resistance to temptation (Kuczynski et al., 1997; Parke, 1977). It also helps when mothers shift their control strategies from physical techniques such as distraction to verbal modalities such as explanations, bargaining, and reprimands as the child grows older (Kuczynski et al., 1987). This adjusted parental input heightens the child's own abilities to use verbally based control strategies (Kopp, 2002). In addition, a mutually responsive orientation involving cooperation and shared positive affect between mother and child aids in conscience development. Children who, as toddlers, enjoyed this kind of mother-child or father-child relationship developed a higher level of **conscience**—internalized values and standards of behavior—at 3 and 5 years of age than children in a less mutually responsive parent-child relationships (Kochanska et al., 2008; Kochanska & Murray, 2000).

Because children differ in temperament, though, it is not surprising that although, overall, a positive mother-child relationship is linked with strong conscience development in young children, different parental disciplinary strategies are effective with different children. Kochanska (1995, 1997) found that for children who were relatively fearful as 2-year-olds, mothers' gentle discipline that deemphasized power was correlated with evidence of conscience in the preschool period, whereas, for relatively fearless children, parental strategies that focused on positive motivation promoted higher levels of self-control.

The Affective Side of Morality

The development of moral behavior also involves emotions. We have all experienced "feeling bad" when we break a rule. We may feel remorse, shame, or guilt. Do children have these same emotional reactions? Kochanska and her colleagues (2002) tested young children at 22, 33, and 45 months. They presented each child with an object that belonged to the experimenter (e.g., a favorite stuffed animal the experimenter had kept from her childhood or a toy she had assembled herself) and asked the child to be very careful with it. However, the objects had been "rigged" and fell apart as soon as a child began to handle them. Even at 22 months, children "looked" guilty when the mishap occurred; they frowned, froze, or fretted. At older ages, children were better at mask-

ing their guilty reactions; they expressed fewer overt negative emotions. Instead, guilt leaked out in the form of subtle signs such as changes in posture, squirming, hanging the head, and other indications of arousal and upset. When they were later tested at 56 months, the children who had displayed more guilty reactions were less likely to play with forbidden toys than children who had not shown any guilty feelings.

Girls in Kochanska's study displayed more guilt than boys. Other researchers have reported similar gender differences in middle childhood (Zahn-Waxler, 2000). Perhaps this reflects the fact that girls are expected to adhere more closely to rules than are boys and thus may experience more upset when they violate them.

Children who displayed more guilt in the Kochanska study were also more fearful in scary situations, such as climbing a ladder, falling backward on a trampoline, or interacting with a clown. In other research as well, 6- and 7-year-old children who were fearful as infants were rated by their parents as more prone to guilt and shame (Rothbart et al., 1994). Analyses of Kochanska's data suggested that fearful temperament contributes to guilt proneness, which in turn serves to inhibit children's tendency to violate rules. In contrast, fearless children do not experience remorse, guilt, or shame if they violate rules, and because they feel no guilt, the lack of guilt does not deter them from future rule violations.

Consistency Across Situations

Are children consistent in their moral behavior across situations? In an extensive investigation of moral behavior in children, Hartshorne and May (1928) gave 11,000 school-age children the opportunity to cheat, steal, and lie in a wide variety of situations—athletics, social events, the school, the home, alone, or with peers. There was a high degree of consistency in individual children's behavior (Burton, 1963, 1984). Each child had a general predisposition to behave either morally or immorally in a variety of situations. The more similar the situations, the more consistent was the child's behavior. In markedly different situations, other variables such as fear of detection, peer support for deviant behavior, and the importance of the outcome for the child affected the likelihood that the child would cheat.

THE EVOLUTION OF PROSOCIAL AND ALTRUISTIC BEHAVIORS

Prosocial behavior is voluntary behavior intended to benefit another person. It may be motivated by egoistic, practical, or other-oriented concerns. **Altruistic behavior** is also voluntary behavior designed to help someone else. However, **altruism** is motivated by an unselfish concern for the welfare of other people. What distinguishes altruistic behavior from prosocial behavior is the willingness to help another without any thought of compensation. Altruistic acts are motivated by internalized values, goals, and self-rewards rather than by the expectation of concrete or social rewards (Eisenberg et al., 2006). Prosocial behavior includes sharing and cooperating with others, helping or caring for them, sympathizing and comforting them in times of distress and need, and performing acts of kindness; prosocial behavior can also encompass actions designed to help groups of people, societies, nations, and even the world. When people act altruistically, however, they do so without thought for their own immediate welfare, without expectation of reciprocity or acknowledgment (they often act anonymously), and sometimes even at the sacrifice of their own longer term needs and wishes. According to Eisenberg and colleagues (2006), we see the beginnings of prosocial behavior in quite young children, whereas truly altruistic behavior occurs only later on.

prosocial behavior Behavior designed to help or benefit other people.

altruistic behavior Intrinsically motivated behavior that is intended to help others without expectation of acknowledgment or concrete reward.

altruism An unselfish concern for the welfare of others.

Turning Points

PROSOCIAL AND ALTRUISTIC BEHAVIOR

BIRTH–6 MONTHS
- Responds positively to others (smiles, laughs with others)
- Participates in social games (e.g., peekaboo)
- Reacts emotionally to others' distress (crying or general upset)

6–12 MONTHS
- Takes an active role in social games
- Exhibits sharing behaviors
- Displays affection to familiar persons

12–24 MONTHS
- Refines ability to point with index finger
- Complies with simple requests
- Indicates knowledge of rules of cooperative games
- Shows knowledge of caregiving skills
- Comforts people in distress
- Participates in adults' work, household tasks
- Shows and gives toys to adults

24–36 MONTHS
- Draws person's attention to objects with words as well as gestures
- Exhibits increasingly planned caregiving and helping behaviors
- Verbally expresses own intentions to help and knowledge of tasks
- Gives helpful verbal advice
- Tries to protect others

3–ABOUT 7 YEARS
- Is hedonistically motivated to perform prosocial acts

3–11 YEARS
- Recognizes others' needs even when they conflict with own

6–17 YEARS
- Justifies prosocial or nonprosocial behavior by reference to stereo-typical notions of good and bad and considerations of approval and acceptance from others

10–17 YEARS
- Empathizes with others and feels pride or guilt about consequences of own actions

14–17 YEARS
- May justify helping or not helping by internalized values and by concern with rights and dignity of others
- May believe in individual and social obligations, the equality of all individuals, and may base self-respect on living up to own values and accepted norms
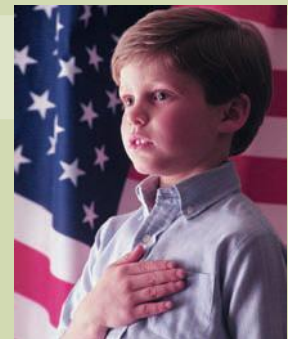
Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Individual children vary greatly in the ages at which they achieve these developmental changes.

Sources: Based on Eisenberg, Fabes, & Spinrad, 2006; Hay & Rheingold, 1983.

How Prosocial Behavior Evolves

As the Turning Points chart on page 522 shows, the roots of prosocial behavior appear in infancy, when children show things to others or share their toys. Rheingold and her colleagues found that among 12- to 18-month-old children, showing and giving toys to a variety of other people (mothers, fathers, and strangers) are very common (Hay, 1994; Rheingold et al., 1976). Children engage in these early sharing activities without prompting or direction and without being reinforced by praise.

CHANGES IN PROSOCIAL BEHAVIORS   Sharing and showing are not the only ways young children reveal their capacity for prosocial action. From an early age, children engage in a variety of other behaviors such as caring for siblings, helping adults with housework, or comforting others in distress (Hastings et al., 2007). Children between 10 and 12 months old typically become agitated or cry in response to another child's distress, but they make little effort to help the other child. By the time they're 13 or 14 months old, however, they often approach and comfort another child in distress. This comforting, though, may not be specific to the source of distress. By 18 months, children not only approach a distressed person but also offer specific kinds of help. For example, they may offer a toy to a child with a broken toy or a Band-Aid to a mother with a cut finger. By age 2, children engage in a wide range of prosocial actions, including verbal advice ("Be careful"), indirect helping (getting their mother to retrieve the baby's rattle), sharing (giving food to a sister), distraction (closing a picture book that has made their mother sad), and protection or defense (trying to prevent another from being injured, distressed, or attacked) (Garner et al., 1994; Lamb & Zakhireh, 1997; van der Mark et al., 2002).

Children do not always show prosocial reactions to others' distress, and indeed, they sometimes laugh or behave aggressively or even become distressed themselves (Lamb & Zakhireh, 1997; Radke-Yarrow & Zahn-Waxler, 1983; Zahn-Waxler et al., 1992b). However, based on a *meta-analysis* of many relevant studies, Eisenberg et al. (2006) found clear evidence that as children grow older, they are generally more likely to engage in prosocial behaviors. Specifically, prosocial behavior increases from infancy and the preschool years through middle childhood to adolescence. Prosocial behavior not only increases with age; it also increases with cognitive maturation. Toddlers who display self-recognition are more empathic and prosocial (Zahn-Waxler et al., 2001);

Donating to a school food drive to help people less fortunate than themselves is an important lesson in prosocial behavior for young children.

preschool children who are able to take another person's perspective are more prosocial (Zahn-Waxler et al., 1995). Prosocial behavior also increases as children learn to detect other people's emotional cues and realize that they need help (Eisenberg et al., 2006).

STABILITY AND STYLES OF PROSOCIAL BEHAVIOR   Baumrind (1971) measured preschool children's nurturant, sympathetic, and thoughtful behaviors toward peers and then assessed these behaviors in the same children 5 or 6 years later. The behaviors were moderately stable between the two ages; children who behaved more prosocially at age 4 were more likely to behave prosocially at age 9. Other longitudinal studies have told a similar story. Children's tendencies to donate to needy children, to assist an adult (e.g., by helping pick up paper clips), and to offer others help are consistent across elementary school (Eisenberg et al., 2006). During adolescence, prosocial behavior toward peers is relatively stable (Wentzel et al., 2004), as is young adults' valuing of concern for others (Pratt et al., 2004).

Children have different styles of expressing their prosocial intentions, however. Researchers studying 2-year-olds' reactions when their mothers cried after reading a sad story in the newspaper observed a number of different reactions (Radke-Yarrow & Zahn-Waxler, 1983). One child tensed up and fought back her tears. Another asked, "What's wrong, Mommy?" A third tore up the newspaper that made her mother cry. As these very different reactions illustrate, children develop their own styles of dealing with others' distress. Some children are very emotional and get upset. Others are cool and reflective and approach the situation more cognitively, inspecting, exploring, and asking questions. Still others are aggressive or defensive—for example, hitting the person who made the baby cry. Children's prosocial styles also tend to be stable across time. These researchers observed stability in style from age 2 to age 7 in about two thirds of the children they studied.

Are Girls More Prosocial Than Boys?

Gender differences vary depending on the type of prosocial behavior (Eisenberg et al., 2006; Fabes & Eisenberg, 1996). Differences are greatest for kindness and consideration; girls consistently express more of these kinds of prosocial behavior than boys do. Girls are also more **empathic** than boys (Zahn-Waxler et al., 2001), especially as they get older (Eisenberg et al., 2006). That is, girls have a greater capacity to experience the emotions that others feel. Girls are also slightly higher than boys in instrumental helping, comforting, sharing, and donating, but gender differences in these behaviors are less dramatic.

Of note, gender differences are more pronounced when the data are derived from self-reports and reports by family members and peers than in data gathered by observational techniques (Hastings et al., 2005). This suggests that some gender differences reflect people's conceptions of what boys and girls are *supposed* to be like rather than how they actually behave (Eisenberg et al., 2006; Hastings et al., 2007). Parents do stress the importance of politeness and prosocial behavior more for daughters than for sons (Maccoby, 1998). Moreover, when girls behave prosocially, parents attribute such behaviors to inborn tendencies, whereas they attribute boys' prosocial behaviors to the influences of the environment and socialization. These findings do not mean that gender differences are *only* in the eye of the self or the beholder; rather, these cultural stereotypes and beliefs that girls are made of "everything nice" contribute to the gender differences researchers have found (Hastings et al., 2007).

Determinants of Prosocial Development

Like most behaviors, prosocial behavior has both biological and environmental determinants.

empathic Able to experience the same emotion that someone else is experiencing.

BIOLOGICAL INFLUENCES   Some evolutionists argue that human beings have a biological predisposition to respond with empathy and are biologically prepared to engage in prosocial behavior (Sober & Wilson, 1998). As evidence of this, helping and sharing are seen among many infrahuman animals; for example, Preston and deWaal (2002) report both empathy and consoling behavior in chimpanzees. It has also been claimed that the fact that human newborns cry in response to the cries of other infants is evidence of such a biological predisposition to behave in an empathic fashion (Hoffman, 1981, 2000).

There is also evidence that individual differences in prosocial behavior may have a genetic basis. Identical or monozygotic twins are more alike in prosocial behavior (Davis et al., 1994) and empathic concern (Zahn-Waxler et al., 1998) than are fraternal or dizygotic twins. Other studies of identical twins underscore the combined role of genetic and environmental factors in the development of children's prosocial behavior (Hastings et al., 2005). For example, in a study of identical preschool-age twins, Deater-Deckard et al. (2001) found that both genetic and environmental factors (e.g., maternal supportive and punitive behaviors) contributed to children's prosocial behavior. Further support for the genetic basis of prosocial behavior comes from the study of children with genetic abnormalities. Children who have Williams syndrome (marked by loss of the long arm of chromosome 7) are more sociable, empathic, sympathetic, and prosocial than children who do not have Williams (Mervis & Klein-Tasman, 2000; Semal & Rosner, 2003).

Researchers are beginning to isolate the neurological roots of prosocial behavior. For example, studies using the neuroimaging PET scan reveal that neural structures associated with emotions (in particular, the *amygdala*) were more activated in response to sad than to neutral stories (Decety & Chaminade, 2003).

Temperament may play a role in the likelihood of children's sympathetic responding and prosocial behavior, just as it appears to influence children's ability to inhibit undesirable responses. For example, highly inhibited 2-year-olds became more upset by another's distress than their less inhibited peers (Young et al., 1999). Similarly, children who can regulate their emotions better, as indexed by measures of heart rate, are more likely to exhibit comforting behavior (Eisenberg et al., 1996).

In sum, a variety of biological factors—evolutionary, genetic, neurological, and temperamental—predispose children to behave prosocially. These biological influences interact with the environment in determining how prosocial a child will be.

ENVIRONMENTAL INFLUENCES   Environmental factors affecting children's willingness to behave prosocially include the family, peers, and mass media. Laboratory studies in which children see people donate to or share with others, as well as real-life situations in which parents, peers, and others model prosocial behaviors, demonstrate that children acquire prosocial behaviors through social learning (Eisenberg et al., 2006; Hart & Fegley, 1995). Daughters whose mothers are sensitive to their emotions, who try to find out why they feel bad and listen to them when they are anxious and upset, display more prosocial behavior; for example, they will comfort an infant in distress (Eisenberg et al., 1993). The way that mothers talk about emotions matters, too. Preschoolers whose mothers explain their own feelings when they are sad display more prosocial behavior (Denham, 1998; Denham et al., 2007). In addition, children who have opportunities to engage in prosocial actions, by volunteering at homeless shelters, for example, develop more prosocial attitudes and behavior (Johnson et al., 1998; Metz et al., 2003; Pratt et al., 2003).

As the study in Box 14-2 shows, parents' child-rearing practices also contribute to children's prosocial behavior. Parents who use power-assertive techniques (e.g., physical punishment) and little reasoning and who show little warmth are unlikely to have altruistic children. In a study in the Netherlands, Dekovic and Janssens (1992) found that democratic parenting (parenting that is warm, supportive, and demanding and that provides guidance and positive feedback) was linked to more prosocial behavior in children as rated by both teachers and peers. Studies in the United States, Canada, and

BOX 14-2

Child Psychology in Action

HOW PARENTS CAN TEACH CHILDREN PROSOCIAL BEHAVIOR

To find out how children learn to react in helpful ways when they have caused distress in another person or when they see another person suffering, Carolyn Zahn-Waxler and her colleagues (1979) devised a clever scheme. They trained mothers of 18-month-olds to tape record their children's reactions to others' distress that the children themselves either caused or witnessed. The mothers recorded both the child's and their own behavior over a 9-month period, during which observers occasionally visited the home to check on the accuracy of the mothers' records. The researchers also asked the mothers to simulate distress from time to time: For example, mothers might pretend to be sad (sobbing briefly), to be in pain (bumping their feet or heads, saying "Ouch," and rubbing the injured parts), or to suffer respiratory distress (coughing/choking).

How did the children respond to others' distress? Overall, whether they had hurt someone else or merely witnessed another person's distress, they reacted in a helpful fashion about a third of the time. However, some children responded in most distress situations (between 60% and 70%), whereas others failed to respond at all.

Mothers' reactions to their own children's harmful behavior toward others, as well as to the sight of another person's distress, were related to their children's helpful behavior in distress situations. Some mothers linked a child's behavior with its consequences for the child's victim; the children of these mothers were more likely to respond in a helpful way when they caused harm to someone. These mothers might say, for example, in a clear but objective man-

ner, "Tom's crying because you pushed him." Other mothers' discussions of distress situations had strong emotional overtones, and these explanations appeared to be even more effective. The children of these mothers were more likely to intervene in bystander situations when they did not cause any harm but saw that someone else was upset. These mothers might say something like, "You must never poke anyone's eyes," or "When you hurt me, I don't want to be near you. I am going away from you."

More recent studies have confirmed these findings. For example, children of mothers who pointed out a peer's personal distress in an affectively charged manner tended to react in a sad fashion (Denham et al., 1994). However, some maternal tactics were ineffective in encouraging prosocial behavior. For example, physical restraint (simply moving away from the child or moving the child away from a victim), physical punishment (a mother might have reported, "I swatted him a good one"), or unexplained prohibitions ("Stop that!") may even interfere with the development of prosocial behavior. These researchers also found that when mothers showed anger as they delivered their disciplinary reasoning and tried to induce guilt in children, preschoolers were unlikely to engage in parent-directed prosocial actions.

Prosocial and altruistic behavior can begin early, and parents play an important role. They can facilitate and encourage the child's emerging altruistic behaviors by helping children make connections between their own actions and other people's emotional states. Altruism truly does begin at home!

Great Britain, similarly, indicated that when parents were negative and controlling and intolerant of children's distress, children were less empathic and prosocial (Asbury et al., 2003; Strayer & Roberts, 2004).

Parents who explicitly model prosocial behavior and provide opportunities for children to perform these actions may be particularly successful in promoting altruism (Eisenberg et al., 2006). A common way parents provide opportunities for learning prosocial behavior is by assigning children responsibility for household tasks. Even 2-year-olds will help adults in a variety of tasks such as sweeping, cleaning, and setting tables (Rheingold, 1982). Allowing children to help in these ways may be important for their prosocial development. Nor are the effects limited to young children. McLellan and Youniss (2003) found that adolescent volunteering was more common when the parents engaged in volunteer activities. Adolescents even modeled the types of voluntary services in which their parents engaged, such as working in a homeless shelter or working for an environmental cause.

Peers also act as models and shapers of children's prosocial behavior. In one study, preschoolers who were exposed to prosocial peers at the beginning of the school year engaged in more prosocial peer interactions later in the year (Fabes et al., 2002). However, in general, children who were less prosocial spent their time with other less prosocial children, while highly prosocial children played together. As a result of this "prosocial segregation," children who are low in prosocial behavior have few chances to learn more prosocial practices from their prosocial peers. Moreover, preschoolers who initiated more altruism received more altruism from their peers a year later, although the converse was not true. Only the state of being the recipient was not related to increases in receiving altruistic behavior from peers. Being an active participant in being helpful and kind likely lead to reciprocity of prosocial acts from peers (Persson, 2005).

TV and Prosocial Behavior   Television is another learning medium for prosocial behavior (Comstock & Scharrer, 2006). Researchers have assessed the impact of *Mister Rogers' Neighborhood*, *Barney*, *Sesame Street*, and other programs focused on understanding the feelings of others, expressing sympathy, and helping. Children who watched these programs not only learned the specific prosocial content of the programs but were also able to apply that learning to other situations involving peers. In comparison with children who watched shows with neutral content, they learned general rules about prosocial behavior (Friedrich & Stein, 1973; Huston & Wright, 1998; Singer & Singer, 2001). This was especially true for young children from middle- to upper-class families whose parents watched the programs with them and encouraged their altruistic behavior (Mares & Woodward, 2001).

CROSS-CULTURAL PERSPECTIVES   In some cultures, children are given more responsibility for taking care of siblings and performing household tasks (Eisenberg et al., 2006). What effect does this have? Cross-cultural studies of children from a wide range of societies—in Mexico, Japan, India, and Kenya—suggest that children who perform more domestic chores and spend more time caring for their infant brothers, sisters, and cousins are more altruistic (Whiting & Edwards, 1988; Whiting & Whiting, 1975). Similar results have been found in cultures that stress communal values, such as that of the Aitutaki of Polynesia, the Papago Indian tribe in Arizona, and many Asian cultures (Chen, 2000; Eisenberg et al., 2006; Zaff et al., 2003). Further evidence of the role of culture comes from studies of children raised in Israeli kibbutzim, which stress prosocial and cooperative values. Children reared in these communal settings are more prosocial than their city-reared peers (Aviezer et al., 1994). Mexican American children are more prosocial than European American children (Knight et al., 1982). However, as they become teenagers and more acculturated to U.S. norms, they report less prosocial behavior (de Guzman & Carlo, 2004).

Prosocial Reasoning

Prosocial behavior shifts in form and expression across development. These changes reflect changes in **prosocial reasoning**, which in turn reflect changes in children's cognitive development. Eisenberg and her colleagues (Eisenberg et al., 1999, 2001b, 2006) proposed a model of the development of prosocial reasoning that is similar to the Kohlberg model of the development of moral reasoning. To test the model, they devised a number of hypothetical dilemmas. Here is a sample.

> One day a girl named Mary was going to a friend's birthday party. On her way she saw a girl who had fallen down and hurt her leg. The girl asked Mary to go to her house and tell her parents so they could come and take her to the doctor. But if Mary did run and get the child's parents, she would be late to the birthday party and miss the ice cream, cake, and all the games. What should Mary do? Why?

prosocial reasoning Thinking and making judgments about prosocial issues.

Eisenberg and her colleagues tested children when they were 4.5 and 11.5 years old and again in early adulthood. As the children matured, they became less egocentric and more other oriented, and they became more capable of abstract reasoning about prosocial dilemmas. The first type of reasoning, shown in Table 14-2, was **hedonistic reasoning**, in which children based their decision to perform a prosocial act on the promise of material reward. This type of reasoning decreased with age. The second type of reasoning was **needs-oriented reasoning**. This was still a relatively simple type of reasoning in which children expressed concern for the needs of others, even though these needs conflicted with their own. It peaked in middle childhood and then leveled off. The higher types of reasoning listed in the table were empathic and prosocial; they all increased with age. Hedonistic reasoning was related to less sharing and empathy; needs-oriented reasoning was related to more prosocial behavior; prosocial reasoning was related to more prosocial behavior that required some cognitive reflection (Carlo et al., 2003).

Beliefs about appropriate behavior toward others are grounded in bodies of religious and philosophical thought that have deep roots in the history of the culture. Not surprisingly, therefore, researchers have found that there are cultural differences in prosocial

Table 14-2   Evolution of prosocial reasoning

Level	Age Group	Orientation	Mode of Prosocial Reasoning
1	Preschoolers and younger elementary schoolchildren	Hedonistic, self-focused	Child is concerned with self-oriented consequences rather than moral considerations. Decision to help or not help another is based on consideration of direct gain to self, future reciprocity, and concern for people to whom the child is bound by affectional ties.
2	Preschoolers and elementary schoolchildren	Recognition of needs of others	Child expresses concern for the physical, material, and psychological needs of others even if these needs conflict with her own. Concern is expressed in the simplest terms, without verbal expressions of sympathy, evidence of self-reflective role taking, or reference to internalized affect such as guilt.
3	Elementary and high school students	Seeking others' approval and acceptance	Child uses stereotyped images of good and bad persons and behaviors and considerations of others' approval and acceptance in justifying prosocial or nonhelping behaviors.
4	Older elementary school and high school students	(a) Empathic	Child's judgments include evidence of sympathetic responding, self-reflective role taking, concern with the other's humanness, and guilt or positive affect related to the consequences of her actions.
	Minority of high school students	(b) Transitional (empathic and internalized)	Child's justifications for helping or not helping involve internalized values, norms, duties, or responsibilities, and may refer to the necessity of protecting the rights and dignity of other persons. These ideas, however, are not clearly stated.
5	Only a small minority of high school students and virtually no elementary schoolchildren	Strongly internalized	Child's justifications for helping or not helping are based on internalized values, norms, or responsibilities, the desire to maintain individual and societal contractual obligations, and the belief in the dignity, rights, and equality of all individuals. Child also construes her self-respect as based on living up to her own values and accepted norms.

Source: Adapted from Eisenberg, Lennon, & Roth, 1983.

reasoning, as there are differences in prosocial behavior. For example, in Asian countries, people take a more collective approach to social and interpersonal behavior than do people in Western nations, placing their emphasis on the welfare of the group or nation rather than of the individual. In these cultures, ties of responsibility and reciprocity may be more binding than they are here. However, America is not the least prosocial culture. In Germany and Israel, children are more likely than American children to emphasize direct reciprocity, whereby they expect to receive payback for their prosocial actions (Eisenberg et al., 1985); in Brazil, urban adolescents are less likely to use high-level prosocial reasoning than U.S. teens (Eisenberg et al., 2001). Clearly, cultural values not only shape prosocial behaviors but also organize the ways people think about their prosocial obligations to others.

THE DEVELOPMENT OF AGGRESSION

Aggression is the opposite of prosocial behavior; it refers to behavior that is intended to and does harm to other people by inflicting pain or injury on them. The notion of intention is crucial, for we need to separate acts of aggression from the actions taken by parents in disciplining their children and from the actions of doctors and dentists who must at times cause pain to preserve physical health. What distinguishes painful actions of these kinds from acts of aggression is that their intention is not to cause pain or harm but to better the condition of others. For decades, psychologists have puzzled over the knotty problem of aggression. Why do some children attack others? Why do some adults cheat, rob, attack, and murder others? Do patterns of aggression change over time, and if so, how? What roles do families, peers, and the mass media play in the development of aggression? Most important, how can we control aggression in our children?

aggression Behavior that intentionally harms other people by inflicting pain or injury on them.

How Aggressive Behavior Develops in Children

A visit to a preschool and a stopover at an elementary school playground can reveal some striking age differences in the forms and frequency of aggressive behavior. (The Turning Points chart on page 530 offers a brief outline of how aggression changes over time.) Preschool children are more likely to quarrel and fight over toys and possessions; this is **instrumental aggression**. Older children are more likely to exhibit **hostile aggression**—personally oriented aggressive acts in which the child criticizes, ridicules, tattles on, or calls the person names (Dodge et al., 2006). This shift from fighting over things to fighting over human characteristics and behaviors may occur as older children acquire a greater ability to infer the intentions and motives of others (Ferguson & Rule, 1980). When older children recognize that another person wants to hurt them, they are more likely to retaliate by a direct assault on the tormentor than by an indirect attack on the aggressor's possessions.

Despite children's gradually improved ability to infer intent, individual children differ in how accurately they can "read" another person's intentions. Some children, especially those who are highly aggressive, have more difficulty judging other people's intentions. We can apply the information-processing model of social behavior (discussed in Chapter 12) to aggressive behavior (Crick & Dodge, 1994). This is especially helpful in ambiguous situations, when children's intentions are not clearly either aggressive or prosocial. In such situations, boys who are rated by their classmates as more aggressive are likely to react in a hostile way—as if the other person intended to be aggressive. Aggressive boys see the world as a threatening and hostile place. The reason for their negative views may be based on their experience: Aggressive boys not only commit more unprovoked aggressive acts, but they are also the targets of more aggressive attacks (Dodge & Frame, 1982). Researchers have found that aggressive children

instrumental aggression Quarreling and fighting with others over toys and possessions.

hostile aggression Directing aggressive behavior at a particular person or group, criticizing, ridiculing, tattling on, or calling names.

Turning Points

THE DEVELOPMENT OF AGGRESSIVE BEHAVIOR

INFANCY: 0–2 YEARS	• The child expresses anger and frustration • Shows some early signs of aggression (pushing, shoving) • Temperamental differences in irritability predict later aggression
PRESCHOOL YEARS: 2–5 OR 6 YEARS	• If encouraged by family members in antisocial behavior, the child may later begin to display seriously aggressive behavior • The child tends to display instrumental aggression, fighting over toys and possessions, and to rely on the physical expression of aggression • Girls exhibit more verbal and relational aggression, excluding and gossiping about others, whereas boys are more physical
6–7 YEARS	• Children display hostile aggression, using criticism, ridicule, name calling, and tattling, as they begin to infer and to judge the intentions of others • Instrumental aggression decreases
ELEMENTARY SCHOOL AGE: 7–10 YEARS	• Differences between boys' reliance on physical aggression and girls' reliance on relational aggression become more marked • In both boys and girls, physical aggression gradually declines, and verbal aggression becomes more common • Children may begin to do poorly in school and to be rejected by peers if aggressive • In the fourth or fifth grade, parental monitoring becomes particularly important to deter delinquency and vandalism
ADOLESCENCE	• Aggressive children select aggressive and deviant peer groups • Among some youth, vandalism, use of guns, and delinquency increase • Gender differences are marked: Rates of delinquency and violent behavior are much higher among boys than girls • Hormonal changes, such as rising levels of testosterone, are associated with increases in reactive aggression in boys; individual differences in hormonal levels are important determinants of the levels of aggression

Note: Developmental events described in this and other Turning Points charts represent overall trends identified in research studies. Patterns of aggressive behavior vary greatly among individual children (see especially The Family as a Training Center for Aggression).

Sources: Coie & Dodge, 1998; Crick et al., 1998; Dodge, Coie, & Lynam, 2006; Ostrov & Crick, 2006; Underwood, 2004.

reactive aggression
Aggressive behavior as a response to attack, threat, or frustration.

proactive aggression
The use of force to dominate another person or to bully or threaten others.

make more hostile attributions about other people's behavior in studies of European American, African American, and Latino American children (Graham & Hudley, 1994; Guerra & Huesmann, 2003).

The kinds of aggression children display can be characterized in yet other ways. Some children act aggressively only in response to being attacked, threatened, or frustrated, displaying **reactive aggression**. These children are particularly likely to misinterpret others' intentions (Poulin & Boivin, 2000). Other children—playground bullies—show **proactive aggression**, using force to dominate another person or to threaten another to gain a prized object or possession. They are quite accurate in reading others' intentions, but they don't care about their intentions, just about dominating them. Like instrumental aggression, proactive aggression generally decreases across development. For

Relation between childhood aggression ratings and adult criminal convictions
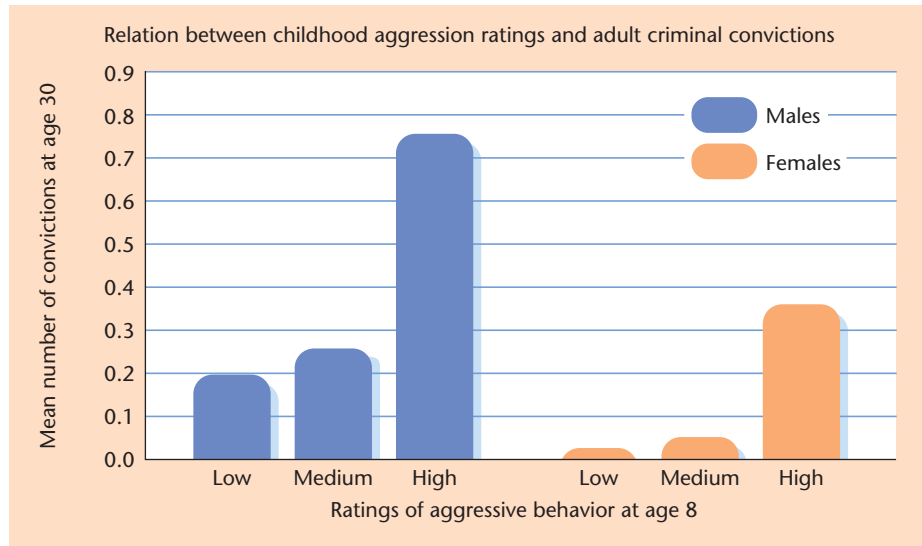
Figure 14-4

The relation between childhood aggression and adult criminal behavior

Among males, the correlation between highly aggressive behavior in childhood and the number of criminal convictions in later life was .75, which is extremely high. The same correlations for boys who showed little or only moderate aggressiveness in childhood were much lower, as were all the same correlations for females. Note, however, that among females we see the same tendency of rising correlations as the degree of early aggression escalates.

Source: Adapted from Huesmann, Eron, Lefkowitz, & Walder, 1984.

example, in one study, "hits others" occurred in 70% of the children observed when they were 2 or 3 years old, but it declined to 20% by ages 4 and 5 and to 12% by third grade (NICHD Early Child Care Research Network, 2004b).

The ways children express their aggression also change over development. Toddlers rely more on physical attacks; older children, with their improved communication skills, are likely to aggress verbally rather than physically (Dodge et al., 2006). This developmental shift is due not only to increased verbal skills but also to changes in adult expectations and rules. Most adults become less tolerant of physical aggression as children mature but are more likely to ignore a "battle of words" even among older children. A few older children continue to express aggression physically, however; they fist fight at age 8, vandalize at age 12, and commit homicide at age 18 (Dodge et al., 2006).

Although in general the level of aggression declines as children grow older and learn to solve problems and conflicts through more socially acceptable means, individual differences in aggressiveness are quite stable over time, and those who are particularly aggressive in childhood are likely to remain so into adulthood (Dodge et al., 2006). In one study of more than 600 children originally seen at 8 years of age, researchers found that the more aggressive 8-year-olds were, at age 30, still more aggressive than their peers (Bushman & Huesmann, 2001; Huesmann et al., 1984). The boys who were rated in childhood as aggressive were more likely as adults to have moving traffic violations, to have been arrested for drunk driving, and to have abused their wives; both boys and girls who were rated as aggressive as children were more likely to have criminal convictions by age 30 (see Figure 14-4). In other longitudinal studies as well, young children who were ill-tempered at age 3 had more problems with aggression 6 years later (S. B. Campbell, 2000); ill-tempered 8- to 10-year-old boys experienced more erratic work lives and more marital instability than their even-tempered peers by the time they were 40; ill-tempered girls also experienced more marital instability and were less adequate and more ill-tempered mothers (Caspi et al., 1987; Kokko & Pulkkinen, 2000). Clearly, an early pattern of aggressive behavior leaves its mark.

Gender Differences in Aggression

Although there are few gender differences in aggression in infancy, by the time they are toddlers, boys are more likely than girls to instigate and be involved in aggressive incidents (Loeber & Hay, 1993; Maccoby, 1998). This gender difference is evident not only across U.S. socioeconomic groups but in other countries, including Britain, Canada, Switzerland, Ethiopia, Kenya, India, the Philippines, Mexico, New Zealand, and Japan

(Broidy et al., 2003; Dodge et al., 2006; Whiting & Whiting, 1975). Boys' and girls' aggressive patterns differ in important ways. Boys are more likely than girls to retaliate after being attacked (Darvill & Cheyne, 1981), and they are more likely to attack a male than a female (Barrett, 1979). Boys are more physically confrontational, and their expressions of physical aggression are more frequent than those of girls (Broidy et al., 2003; Ostrov & Crick, 2006). Boys are less likely than girls to engage in negative self-evaluation, they are less likely to anticipate parental disapproval for acting aggressively, and they are also more likely to approve of aggression (Huesmann & Guerra, 1997; Perry, Perry, & Weiss, 1989).

In attempting to resolve conflicts, girls tend to use such strategies as verbal objection and negotiation, methods that may make the escalation of a quarrel into overt aggression less likely (Eisenberg et al., 1994). This does not mean that girls are not aggressive but rather that they use different tactics in achieving their goals. Especially in the elementary school years, girls often use what is called **relational aggression**, or the damaging or destruction of interpersonal relationships (Ostrov & Crick, 2006; Underwood, 2003). In this mode, girls attempt to exclude peers from group participation, besmirch other girls' reputations, and gossip about each other's negative attributes. Researchers have found that girls may choose to harm others by means of social ostracism rather than by direct confrontation. As girls enter adolescence, they tend to make increasing use of the aggressive strategy of excluding others from social cliques (Crick et al., 1999, 2004; Underwood, 2003; Xie et al., 2005). Although relational aggression becomes more common as girls get older, even preschool girls show significantly more relational aggression and are less overtly aggressive than boys (Crick et al., 1997).

Relational aggression is significantly related to social and psychological maladjustment; boys and girls who engage in this type of aggression are more likely to be rejected by their peers (Crick et al., 2004; Ostrov & Crick, 2006). Although this kind of aggression may be less overt, other children notice it, and they ostracize those who engage in it—creating a "mean girls" vicious cycle. More girls than boys view this type of aggression as hurtful and indeed view it as hurtful as physical aggression (Galen & Underwood, 1997; Underwood, 2003). Boys tend to view physical aggression as more hurtful than relational aggression. Table 14-3 and Figure 14-5 illustrate some of the differences between these two types of aggression and between girls' and boys' use of these behaviors.

Gender differences in aggression become more salient as children develop. Marked male-female differences in aggressive behavior are evident in adolescence and adulthood (Moffit et al., 2001). As Figure 14-6 shows, approximately five times as many adolescent boys as girls are arrested for violent crimes (e.g., robbery, aggravated assault, criminal homicide), although in recent years, the number of females found guilty of such crimes has increased (Cairns & Cairns, 1994; Moffitt et al., 2001). However, although males are still more likely to be the victim of a violent crime than females, the gender

relational aggression
Damaging or destroying interpersonal relationships by such means as excluding another or gossiping about or soiling another's reputation.

Table 14-3   Some characteristics of overt and relational aggression in schoolchildren

Sources: Crick, 1997; Ostrov & Crick, 2006.

Overt Aggressors	Relational Aggressors
Hit, kick, punch other children	Try to make other children dislike a certain child by spreading rumors about that person
Say mean things to insult others or put them down	When angry, get over it by excluding another person from group of friends
Tell other children that they will beat them up unless the children do what they say	Tell friends that they will stop liking them unless the friends do what they say
Push and shove others	When angry at a person, ignore the person or stop talking to him or her
Call other children mean names	Try to keep certain people out of their own group during activity or play time
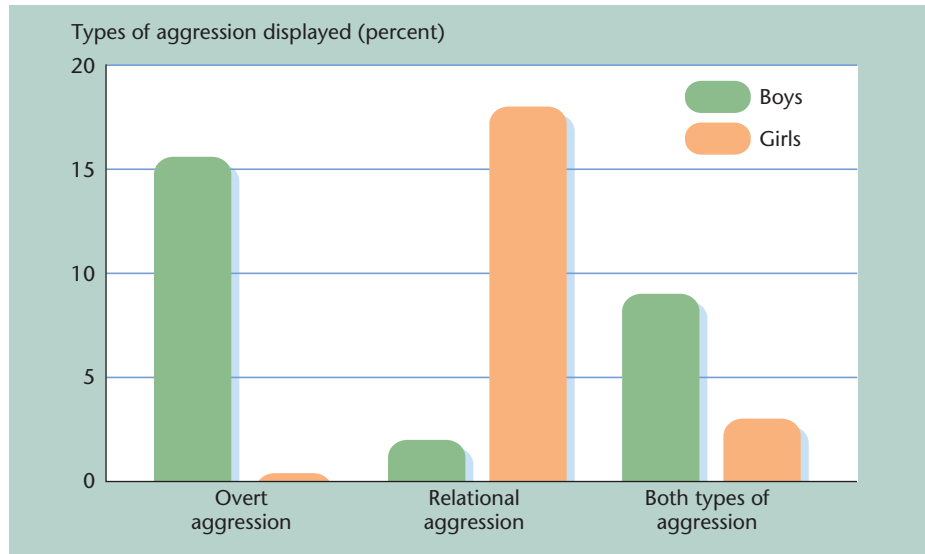
gap has closed over the past three decades from 45% to less than 10%, as Figure 14-7 illustrates (Bureau of Justice Statistics, 2006).

Origins of Aggressive Behavior

The theme of the interplay between biological and environmental influences reappears once again as we explore the causes of aggressive behavior.
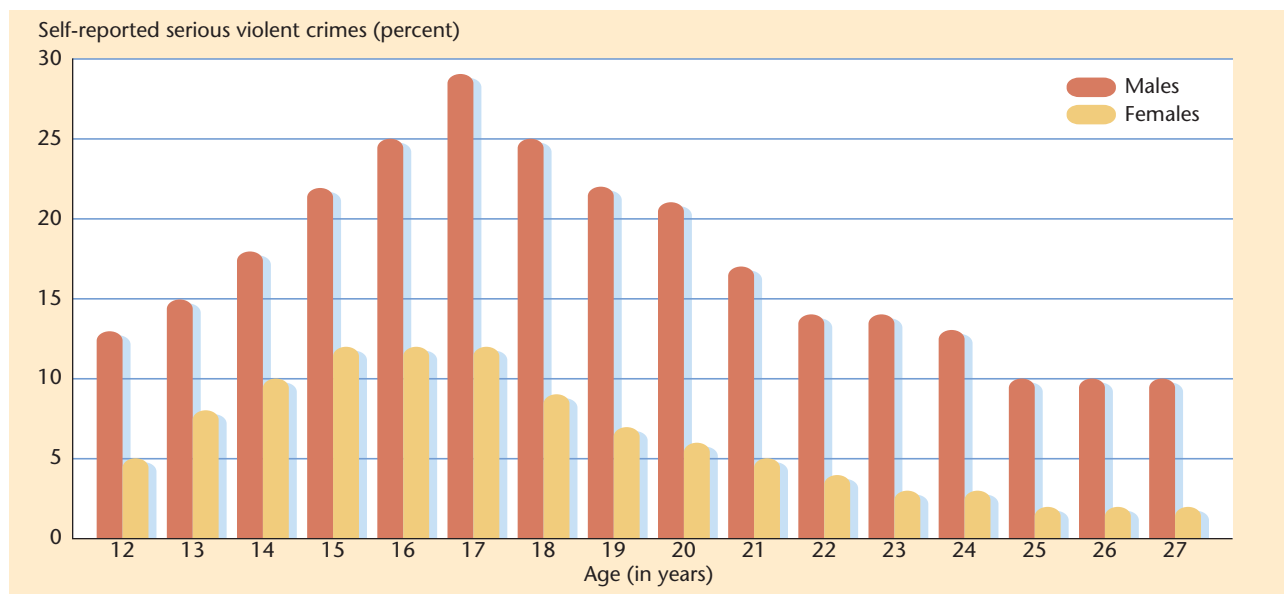
Figure 14-6

Serious violent crime among adolescents and young adults: Self-reports

Serious violent offenses (SVOs), which include aggravated assault (assault with intent to commit a crime), robbery, and rape, rise sharply between the ages of 12 and 17. Although more males than females commit violent offenses, girls are likely to get involved in criminal behavior when they are about 2 years younger than boys (14 versus 16).

Source: Coie & Dodge, 1998.

Figure 14-7

Violent crime rates by gender of victim

Violent crime rates have declined for both male and female victims, and the gender gap has decreased as well.

Source: Bureau of Justice Statistics, 2006.

Violent Crime Rates by Gender of Victim
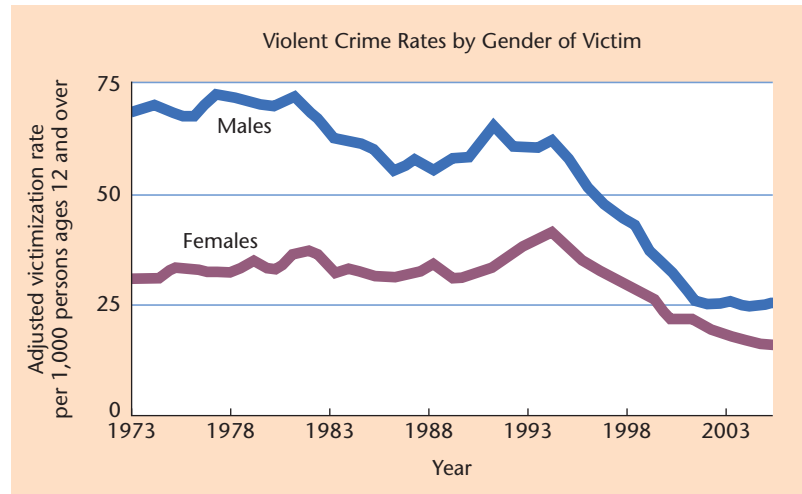
THE ROLE OF BIOLOGY   Aggression has a biological basis. Studies of twins give some support to a role for genetic factors in aggression (Dionne et al., 2003; Rhee & Waldman, 2002). Dionne and her colleagues found that, according to parents' ratings of aggressive behavior, 18-month-old Canadian identical twins were more similar than nonidentical twins. Studies of adolescents have similar findings. Responding to a questionnaire about aggression that contained such items as "Some people think that I have a violent temper," identical twins rated themselves as more similar than did nonidentical twins (Gottesman & Goldsmith, 1994). Researchers in the Netherlands, Sweden, and Britain have obtained similar results (Eley et al., 1999; Van Den Oord et al., 1994).

There are links between hormones and aggression, too. This may be seen rather clearly in adolescence, when hormone levels rise (Moeller, 2001). Brooks and Reddon (1996) found that in the United States, adolescent violent offenders had higher levels of testosterone than nonviolent or even sexual offenders. A study of 15- to 17-year-old boys in Sweden (Olweus et al., 1988) also found a link between testosterone and aggression. Boys whose blood showed higher levels of testosterone rated themselves as more likely to respond aggressively to provocations and threats from others. Boys with high blood levels of testosterone were also more impatient or irritable, which in turn increased their readiness to engage in unprovoked and destructive kinds of aggressive behavior (e.g., to start fights or say hostile things without provocation).

Tremblay and his Canadian colleagues (1998) found another link between testosterone and aggression. In this case, testosterone was related to body mass, which in turn was linked to increased physical aggression. Even when researchers controlled for child-rearing practices, these hormonal effects held. Boys rated as tough and social leaders had the highest testosterone levels, although they were not necessarily higher in everyday aggression. Tough, dominant boys, however, may be more likely to respond aggressively to provocation by lower status peers. Hormones may affect aggression in girls as well (Brook et al., 2001). Levels of hormones, especially estradiol, that increase during puberty were positively linked with adolescent girls' expressions of anger and aggression during interactions with their parents (Inoff-Germain et al., 1988). Interestingly, other work has suggested that there may be reciprocal effects; that is, dominance or success in conflict may lead to a rise in testosterone levels (Schaal et al., 1996). For example, winning a judo contest leads to increases in testosterone levels, but losing results in a drop in levels of this hormone (Dodge et al., 2006; McCaul et al., 1992).

Researchers have also examined the links between aggression and neurotransmitters, chemical compounds that facilitate or inhibit the transmission of neural impulses within the central nervous system (Moeller, 2001). *Serotonin,* a neurotransmitter that

is involved in emotional states and the regulation of attention, has been linked with aggression in both humans and animals (Herbert & Martinez, 2001). In one 2-year study, Kruesi et al. (1992) found a negative relation between the severity of children's physically aggressive behavior and levels of the neurotransmitter serotonin; the lower the level of serotonin, the higher the level of aggression. However, a combination of low levels of serotonin and a history of family conflict was evident in the most violent offenders, a reminder that the environment and biological factors operate together (Moffitt & Caspi, 2006).

Temperament also may be linked with aggressive behavior. Infants with difficult temperaments—those who are irritable, whiny, unpredictable, hard to soothe, and prone to negative affect—are more likely to develop aggressive behavior patterns at later ages (Rothbart & Bates, 2006).

Biological factors do not act independently of the social environment, of course; their influence on aggressive behavior is exacerbated under certain conditions, such as a provoking and threatening situation or a high-risk and conflict-ridden environment (Dodge et al., 2006; Raine, 2002). A Swedish study of adopted children illustrates the joint contributions of biology and environment (Cloninger et al., 1978, 1982). When both the child's biological and adoptive parents were criminals, 40% of the adopted boys were likely to engage in criminal acts. If only the biological parent was a criminal, the percentage declined to 12; if only the adoptive parent was a criminal, it declined to 7%. If neither parent was a criminal, the proportion of adopted males who engaged in criminal acts dropped to 3%. A similar gene-environment interaction was found for girls.

A study of more than 4,000 males in Denmark also illustrates the combined effects of biology and environment on aggression. In this study, a combination of birth complications and early rejection by the mother predicted that adolescents would be involved in violent crime by the time they were 19 years old. Among the young offenders who had experienced both risk factors, 40% became violent, whereas only 20% of those who experienced only one risk factor committed violent crimes (Raine et al., 1998). Finally, a study of Australian 15-year-olds tells a similar story: The most aggressive adolescents were those who were exposed to both biological risks (e.g., maternal smoking during pregnancy, low birthweight, and difficult temperament) and environmental risks (e.g., poverty, harsh discipline, family instability) (Brennan et al., 2003). This cross-national evidence clearly argues for the view that biology and social environments operate together to produce aggressive children. Next we take a closer look at the environmental side of this issue.

THE FAMILY AS A TRAINING CENTER FOR AGGRESSION   Parents clearly play a role in children's aggressive tendencies. Although most parents do not view themselves as giving aggression tutorials, some parents deliberately teach their children, especially boys, to "defend" themselves or to "be a man" (Anderson, 1998). African American families are also likely to encourage daughters to be assertive and defend themselves. But this is not the only way children learn aggression from their parents. When parents argue or fight with one another and, especially, fail to resolve their conflicts in positive ways, they may well be giving implicit instruction to their children. In addition, parents' typical control tactics may contribute to their children's aggression. Parents who use physical punishment, especially inconsistently, are likely to have aggressive, hostile children (Cohen & Brook, 1995; Gershoff, 2002; Patterson, 2002). Physical punishment is especially likely to lead to aggressive behavior when the parent-child relationship lacks warmth (Caspi & Moffitt, 2006; Deater-Deckard & Dodge, 1997) or when parents are abusive (Landsford et al., 2002). The link between physical punishment and aggression is clearer in European American families than in African American families (Deater-Deckard et al., 1996; Landsford et al., 2004).

Since the 1970s, Gerald Patterson's Social Learning Center in Eugene, Oregon, has been one of the world's leading institutions devoted to understanding the origins of aggressive behavior and devising ways of treating children with aggression problems.

Whether her parents have spanked her or spanked a sibling in her presence, this little girl has clearly gotten the message that misbehavior is to be punished severely.

Researchers at this center have found that the family environments of aggressive and nonaggressive children are strikingly different (Patterson, 1982, 2002). Aggressive children's parents tend to be erratic and inconsistent in their use of punishment for deviant behaviors and ineffective in rewarding children for prosocial behaviors. They punish their sons more often, even when the children are behaving appropriately! Such inept parenting practices often lead to cycles of mutually coercive behavior. Children are not passive victims in this process; they often develop behavior patterns in which they quite purposely use aversive behaviors—such as whining and being difficult or committing directly aggressive acts—to coerce parents into giving them what they want. Children learn that such coercive behaviors can help them control the behavior of other family members, including that of siblings. When sibling pairs engage in coercive exchanges, especially if the older sibling is already delinquent, the younger sibling is more likely to become delinquent, too (Slomkowski et al., 2001). A combination of rejecting parenting and sibling conflict is an especially potent recipe for later conduct problems (Garcia et al., 2000). The most appropriate model of discipline recognizes that parents, siblings, and children all influence one another and all contribute to the development of aggression.

Parents not only influence their own children; their influence often continues across generations. To evaluate whether hostile parenting increases the risk of aggressive behavior in the next generation was the goal of a study by Scaramella and Conger (2003). These researchers examined patterns of parent-adolescent interaction and then reexamined these same adolescents when they became parents themselves. The investigators found that adolescents who received hostile parenting were more likely to repeat this style of angry and coercive parenting with their 2-year-olds. In turn, their toddlers exhibited more problem behaviors, including aggressive behaviors. Cross-generational continuity was not inevitable, however. One factor that affected cross-generation consistency was the 2-year-old's emotional reactivity (i.e., how much the child reacted to parental control with an angry emotional reaction). In families in which the young child was high in negative emotional reactivity, there was continuity in hostile parenting from one generation to the next, but when the child was less emotionally reactive, there was no link across generations. This illustrates again the interplay between biology (temperament) and parenting in determining an aggressive outcome.

Families not only contribute directly to their children's aggressive tendencies through the control tactics they use but also shape the development of aggression indirectly. When parents fail to monitor their children's whereabouts, activities, and social contacts, this can be an important determinant of whether children will develop aggressive behavior. Some parents are fully aware of their children's activities, problems, and successes and can report accurately what their children are doing, whom they're with, and where they are. Other parents are largely oblivious to their children's lives. They don't know if their children are hanging out on street corners or are at a school dance, whether they are habitual truants or involved students, or even whether their child is the friendly neighborhood drug dealer. Lack of parental monitoring is associated with high rates of delinquency (Patterson, 2004; Pettit et al., 2001). Children's development of aggressive behaviors may depend as much on parents' awareness of activities in the surrounding community and their efforts to control negative aspects of these activities as on their direct child-rearing practices.
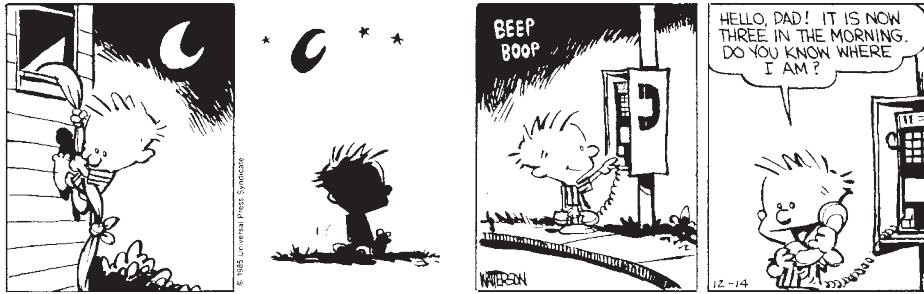
Lack of parental monitoring of a child's activities is associated with aggression and delinquency.

Monitoring children's friends and activities is not just the parents' job, though; it is a shared responsibility between parents and children (Kerr & Stattin, 2000). The ability to monitor relies on the extent to which children share information about their activities and choices of companions with their parents. As Laird et al. (2003) found, monitoring is higher and antisocial behavior is less likely when parents and adolescents spend more time together and have a more enjoyable relationship and when adolescents view monitoring as an appropriate parenting activity.

Patterson and his colleagues showed how children progress from aggression problems in early childhood to full-fledged delinquency in adolescence (Figure 14-8). A negative trajectory starts as a consequence of the early experience of poor parental disciplinary practices and lack of monitoring (Patterson et al., 1989). When these children enter school, two things typically happen: Their peer group rejects them, and they experience academic failure (Buhs & Ladd, 2001; Ladd, 2005; Ladd et al., 1999). In late childhood and early adolescence, these now antisocial children seek out deviant peers who, in turn, provide further training in antisocial behavior and opportunities for delinquent activities (Coie, 2004; Dishion et al., 2001). Among adolescents, aggression is in some cases not only tolerated but admired and viewed as "cool" (Cillessen & Mayeaux, 2004). In spite of their status among their peers, antisocial youth are more likely to be school dropouts, to experience marital problems, and to end up in jail (Patterson & Bank, 1989).

If the family environment is already encouraging antisocial behavior before children are 5 or 6 years old, they are more likely to develop serious and persistent delinquent behavior than if they start on the deviance road at a later age—in middle to late adolescence (Dishion et al., 2001; Moffitt, 2003). These late starters may have avoided the social rejection and school failure common among early starters as well as early family encouragement of antisocial behavior. Early starters also may be at greater risk owing to biological factors. Children who experience perinatal or birth complications, maternal illness during pregnancy, poor infant temperament, limited language understanding, and deficits in executive functioning—combined with social risks such as poverty—are
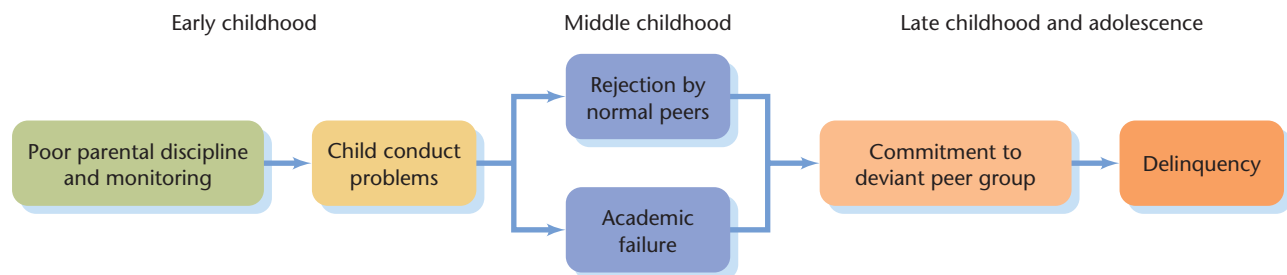
Figure 14-8

Evolution and progression of antisocial behavior

Note that parents, peers, and school all play a role in the evolution of antisocial behavior but at different stages in the child's development.

Source: Adapted from Patterson, DeBarshyshe, & Ramsey, 1989.

the most likely to be aggressive adolescents at age 15 (Brennan et al., 2003). Early starters are also 10 times more often boys than girls (Moffitt, 2003; Moffitt et al., 2001).

TELEVISION VIEWING, VIDEO GAMES, AND AGGRESSION Exposure to aggressive models on TV can increase children's aggressive behavior (Bushman & Huesmann, 2001; Comstock & Scharrer, 2006). Heavy doses of TV violence can also affect children's attitudes, leading them to view violence as an acceptable and effective way to solve interpersonal conflict (Bushman & Huesmann, 2001). Children learn that violence works for both the good guys and the bad guys; it gets things done (Dominick & Greenberg, 1972). Children in Australia, Finland, Great Britain, Israel, the Netherlands, and Poland react to violent TV fare like American children (Bushman & Huesmann, 2001; Huesmann & Miller, 1994).

Frequent viewers of TV violence may also become immune to violence on TV (i.e., they show less emotional reaction when viewing televised aggression) (Cantor, 2000) and indifferent to real-life violence (Drabman & Thomas, 1976). Exposure to TV violence affects children differently depending on their cognitive abilities. Children who were told that a violent film clip was real (a newsreel of an actual riot) later reacted more aggressively than children who believed that the film was a Hollywood production (Atkin, 1983). As children develop and are able to make the fiction-reality distinction, many TV programs may have less impact (Bushman & Huesmann, 2001).

Nor is television the only culprit. Video and computer games may influence aggressive behavior as well (Comstock & Scharrer, 2006). The most notorious case of this was the 1999 Columbine High School incident in which two students shot several classmates. The shooters were described as being "obsessed with the violent video game Doom—in which the players try to rack up the most kills—and played it every afternoon" (Bai et al., 1999, p. 24). This incident does not prove the case, but empirical evidence clearly suggests that violent video games can increase aggression (Anderson et al., 2007; Krahe & Moller, 2004) as well as produce desensitization to actual violence (Carnagey et al., 2007) just as TV violence has been shown to do.

Finally, we are beginning to understand the neurological underpinnings of exposure to media violence. Recent neuroimaging studies using fMRI techniques (see Chapter 5) found that some regions of the brain (e.g., the prefrontal cortex) are less activated when children are exposed to violent than nonviolent scenes from movies (Murray et al., 2006) or violent video games (Weber et al., 2006). This brain region is related to reduced activation of neural mechanisms associated with self-control, which may, in part, aid in explaining why exposure to violence increases aggression.

PEERS, GANGS, AND NEIGHBORHOODS Peers, especially deviant peers, can encourage other children's aggressive tendencies. Researchers have found that if a child's friends engage in disruptive behavior (e.g., disobedience or truancy), the child is more likely to engage in either overt delinquent behavior (e.g., fighting) or covert delinquent behavior (e.g., stealing) both concurrently and a year later (Keenan et al., 1995; Thornberry et al., 2003). Similarly, association with gangs is likely to increase violent activity (Thornberry et al., 2003). Individuals in a gang are three times more likely to engage in violent offenses than those not in a gang (Spergel et al., 1989). Joining a gang increases a child's illegal and violent activity, and leaving one decreases these activities (Thornberry et al., 2003; Zimring, 1998).

Other environmental conditions such as living in a poor, high-crime neighborhood increase children's aggression, but these effects are generally due to changes in family functioning associated with poverty and unemployment. Several researchers have found that poor African American mothers who experienced stress and lack of social support were more likely to display ineffective and coercive parenting; this, in turn, led to aggressive behavior in their children and greater gang involvement (Farver et al., 2005; Guerra et al., 1995; Tolan et al., 2003).

Control of Aggression

How can we control children's aggression? One of the most commonly offered solutions, and yet one whose beneficial effects have been seriously questioned, is the notion of *catharsis,* popularly known as "letting off steam."

THE CATHARSIS MYTH   One of the most persistent beliefs about aggression is that if people have ample opportunity to engage in aggressive acts, whether in actuality or symbolically, a process known as **catharsis**, they will be less likely to act on hostile aggressive urges. Presumably, aggressive urges build up in an individual, and unless this accumulating reservoir of aggressive energies is drained, a violent outburst will occur. The implications are clear: Provide people with a safe opportunity to behave aggressively, and the likelihood of antisocial aggression will be reduced. In clinical circles, there is widespread belief in catharsis. People are often encouraged to express aggression in group therapy sessions. There are punching bags on many wards in mental hospitals and Bobo dolls, pounding boards, and toy guns and knives in play therapy rooms.

catharsis Presumably, discharging aggressive impulses by engaging in actual or symbolic aggressive acts that do not impinge on another person.

Advice columnists in the media have sometimes propagated a similar view. For example, Ann Landers once advised a reader, "Hostile feelings must be released" and went on to recommend that children be taught to vent their anger against furniture rather than against other people. Another reader replied,

> I was shocked at your advice to the mother whose 3-year-old had temper tantrums. . . . My younger brother used to kick the furniture when he got mad. . . . He's 32 years old now and still kicking the furniture. . . . He is also kicking his wife, the cat, the kids, and anything else that gets in his way. . . . Why don't you tell mothers that children must be taught to control their anger? This is what separates civilized human beings from savages.

The research evidence tends to support the advice column's reader. Most studies suggest that aggressive experiences may promote rather than "drain off" aggressive urges. In a classic test of the issue, Mallick and McCandless (1966) allowed third-grade children to shoot a toy gun after being frustrated by a peer who interfered with a task they were working on. Another group of children were allowed to work on arithmetic problems after the peer upset them. Then all the children were given a chance to express their aggression toward the peer who had upset them. The researchers used a rigged

procedure in which children thought they were delivering a shock to the other child; in reality, of course, they were not delivering shocks to anyone. Whether the children, after being frustrated by the peer, had shot the toy gun or worked on math problems made little difference in their delivery of "shocks." Thus, catharsis was insufficient to reduce aggression.

COGNITIVE MODIFICATION STRATEGIES   According to the social information-processing approach to aggression, aggressive children may behave in a hostile and inappropriate fashion because they are **socially unskilled**; that is, they're not very good at solving interpersonal problems (Dodge et al., 2006). In several studies, researchers who asked children and adolescents to come up with solutions to conflict problems in social situations found that aggressive participants in the studies offered fewer solutions than their nonaggressive peers (Crick & Dodge, 1994; Gifford-Smith & Rabiner, 2004). Moreover, the proposals that aggressive children and adolescents suggested were generally less effective than those less aggressive individuals offered.

Making aggressive children and adolescents aware of the negative consequences of aggression for themselves and others through modeling and explanations can reduce aggression, and teaching and encouraging children to use alternative problem-solving behaviors such as cooperation or turn taking have also been found to reduce aggression (Chittenden, 1942; Guerra et al., 1997). One study found that teaching children how to read another person's behavior more accurately—especially helping them to reduce if not wholly give up their biases toward making hostile attributions about other people and their behavior—led to a decrease in aggression among African American boys (Hudley & Graham, 1993). This approach is especially effective with reactively aggressive children, who are poor at reading other people's intentions. Empathy and sympathy also play important roles in the control of aggression. There is a clear link between sympathy, empathy, and lower levels of aggression in children as well as less delinquency in adolescents (Laible et al., 2000; Strayer & Roberts, 2004). Training children and adolescents to be more empathic and sensitive to the views, perspectives, and feelings of others can be an effective way of reducing their aggression (Guerra et al., 1997).

Some psychologists are putting these findings into practical use. Curricula have been developed to improve the social problem-solving skills of aggressive children, and some success has been reported in studies in both the United States and Sweden (Stevahn et al., 2000; Weissberg & Greenberg, 1998a, b). Researchers found that when teachers taught lessons in conflict resolution to their first and sixth graders, these children were less aggressive over time (Aber et al., 2003). The children made fewer hostile attributions, showed fewer conduct problems, and exhibited less aggressive behavior and more prosocial behavior. Box 14-3 describes an example of a successful school-based intervention program.

AGGRESSION PREVENTION: A MULTIPRONGED EFFORT   As we have stressed, many factors influence aggression, and as a result, we need to consider many variables to change levels of aggression. We conclude the chapter with a brief description of one national experiment in controlling aggression, known as Fast Track (Conduct Problem Prevention Research Group, 2004, 2006). In four U.S. cities, more than 200 first graders from poor, mostly minority, families were exposed to a variety of interventions to help prevent aggressive and antisocial behavior. Another 200 children served as the control group. Children in the intervention group participated in a program to help them with social problem solving, emotional understanding, and communication and to teach them how to regulate their actions in the face of frustrating events. For the children with the most serious problems (10% of the group), there was a more intensive program involving academic tutoring, extra social skills training, and a parent intervention designed to improve parenting skills. It worked! Children in the intervention group were less aggressive, improved academically, and developed better social-emotional skills. Moreover, peer relationships improved; children got along bet-

socially unskilled Being unskilled at solving interpersonal problems.

BOX 14-3

Child Psychology in Action

REDUCING BULLYING IN SCHOOLS

Bullying is a worldwide problem. Parents and professionals in Europe, Australia, Japan, New Zealand, Canada, and the United States have all expressed concern about this school-centered problem (Juvonen et al., 2003; Smith et al., 2004). What is bullying? "Bullying is aggression directed repeatedly and specifically toward a specific victim who is, in most cases, weaker than the bully" (Schneider, 2000, p. 106). Between 15% and 30% of children report being victims of bullying (Fonzi et al., 1999; Smith et al., 2004). In fact, according to a Canadian observational study (Craig & Pepler, 1997), an incident of bullying occurs every 7 minutes in a typical school. Bullying occurs more often among boys than among girls and increases through elementary school and into middle school. Most alarming is the fact that bullying and being bullied are related to poorer emotional and social adjustment (Juvonen et al., 2003).

What can be done about this problem? One of the most ambitious efforts comes from Dan Olweus (1993), who launched a nationwide campaign to reduce bullying in schools in Norway and Sweden. The program enunciated four primary goals.

1. Increase awareness of the problem of aggression among the general public and provide schools with information to increase their knowledge about aggressive behavior

2. Get teachers and parents actively involved in the program

3. Develop clear classroom rules to combat aggressive behavior, such as the following:

    We will not bully others.

    We will help students who suffer bullying by others.

    We will include students who have been excluded.

4. Provide support and protection for the victims of aggression

Because it is well known that parents, teachers, and children themselves may all contribute to the levels and kinds of aggressive behavior children display, the program was designed to target all three groups. The program's main components were as follows:

A booklet was prepared for school personnel that described the nature and scope of aggression in the schools and that offered practical suggestions about what teachers and other school personnel could do to control or prevent aggressive behavior. For example, the booklet stressed the importance of increasing not only teachers' awareness of their responsibility to control interpersonal aggression in school but the awareness of other adult personnel as well and the importance of providing more adequate supervision of students during recess times. The booklet encouraged teachers to intervene in bullying situations, and to give students the clear message that "aggression is not acceptable in our school." In addition, the booklet's guidelines advised teachers to initiate serious talks with victims, their aggressors, and the children's parents if aggressive attacks persisted.

A four-page folder was designed to address all parents, giving them basic information and in particular offering assistance to parents of both victims and aggressors.

A videocassette was prepared, showing episodes from the everyday lives of two children who were victims of aggressive attacks.

Students were asked to fill out a short questionnaire anonymously, providing information about the frequency of aggressor/victim problems in the school and describing the ways teachers and parents had responded, including how aware they were of the problem and how ready to take action to deal with it.

Although the program was made available to all schools in Norway and Sweden, the researchers based their detailed evaluation of its effectiveness on data from about 2,500 students in 112 fourth- to seventh-grade classes in 42 primary and junior high schools in Bergen, Norway. Did this multilevel cross-national campaign aimed at reducing aggression work? The answer was clearly yes.

Both 8 and 20 months after the intervention program was initiated, the levels of aggressive behavior the researchers reported were markedly reduced. Fewer children reported being attacked by others, and fewer children reported that they themselves had acted aggressively. Peer ratings told a similar story: Classmates reported that both the "number of students being bullied in the class" and "the number of students bullying others" showed a marked drop. In addition, general antisocial behavior such as vandalism, theft, and truancy declined significantly, and student satisfaction with school life rose appreciably. Similar programs have been launched in many countries, including Canada, Great Britain, Australia, and the United States with at least some success (Juvonen et al., 2003; Smith et al., 2004). Although we can't be sure just which aspects of these programs (class rules, teacher awareness, parental intervention) were most important in achieving these effects, intervention clearly can make a difference in reducing this worrisome problem.

Making the Connections 14

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 14 and discussions in other chapters of this book.

Chapter 14
Morality, Altruism, and Aggression

According to evolutionary theory, humans are biologically prepared to be altruistic.
In Chapter 1, "Child Development: Themes, Theories, and Methods," pp. 16–17

Temperamental differences contribute to the development of self-control.
In Chapter 2, "Heredity and the Environment," p. 67

Cognitive social information-processing skills can affect aggressive behavior.
In Chapter 9, "Cognitive Development: The Information-Processing Approach," p. 314

ter and were better liked by their peers. Parents benefited, too: Their parenting skills improved and they were more involved in school-related activities. By the end of the third grade, 37% of the children in the program had no aggression problems—and 27% of the control group also had no such problems! The positive effects persisted through the fifth grade, according to a recent report (Conduct Problem Prevention Research Group, 2006). Clearly, by mounting a broad-based assault on aggression, children's antisocial behavior can be reduced. However, we have not yet found a magic bullet to eliminate aggressive behavior in all children.

SUMMARY

An Overview of Moral Development

- The socialization of moral beliefs and behavior is one of the main tasks in all cultures. Psychological research has focused on the three basic components of morality: cognitive, behavioral, and emotional.

Cognitive Theories of Moral Development

- Jean Piaget and Lawrence Kohlberg both proposed theories involving invariant sequences of stages of moral development through which children progress as their cognitive capacities become increasingly sophisticated.
- Piaget proposed a three-stage approach: the **premoral stage**, the stage of **moral realism**, and the stage ruled by a **morality of reciprocity**, also called *autonomous morality*. Moral absolutism characterizes moral realism. In contrast, children in the stage of

reciprocity recognize intentionality and the arbitrariness of social rules in their moral judgments.

- Later research has shown that young children can distinguish between intentions and consequences if material is presented to them in a less complex manner. Many other factors affect children's judgments.
- Kohlberg proposed a theory of the development of moral judgment in which each of three levels contains two stages. The order of development is fixed and invariant, and movement is generally from lower levels—the **preconventional** and **conventional levels**—toward a higher one: postconventional level. Moral judgments continue to develop into adulthood, but few individuals reach the most advanced level (Stages 5 and 6).
- Gilligan proposed that Kohlberg's model emphasizes a masculine orientation, focusing on rights and

logic, whereas an interpersonal and caring orientation may more accurately describe women's moral reasoning and judgments.

- Piaget emphasized the role of peers, and Kohlberg emphasized the importance of varied opportunities for role taking in the development of moral judgments. Data suggest that a combination of consistent discipline, involving reasoning and explanation, and concern with the feelings of others tends to produce more mature moral judgments in children. There is also evidence that maturity of moral reasoning is related to cognitive maturity.

- Educational programs in which students explore possible solutions to moral dilemmas may be useful in developing moral reasoning.

- Kohlberg's theory may be flawed in some ways. The theory's third level is controversial; relatively few people reach this level and, in particular, the sixth stage of moral reasoning. In addition, cross-cultural research suggests that Kohlberg's theory is culture-bound.

- **Social-convention rules**, such as table manners and forms of address, are distinct from moral rules and follow a different developmental course; in fact, children learn quite early to distinguish these kinds of rules from each other. Moral judgments do not always lead to moral behavior, particularly among very young children.

The Behavioral Side of Moral Development

- **Self-regulation**, the ability to inhibit one's impulses and to behave according to social or moral rules, proceeds through three stages—the **control phase**, the **self-control phase**, and the **self-regulation phase**. In the latter phase, children become capable of **delaying gratification**.

- Children can learn to use strategies and plans to help them postpone rewards and attend to a task at hand. Specific verbal plans are more useful to children than general directions.

- Self-control or moral behavior is strongly influenced by situational factors. As the elements of situations and types of behavior assessed become more similar, moral conduct is more consistent. The development of **conscience** is linked with children's achievement of self-regulatory capacities. Both self-regulation and conscience are linked with mother-child relationships that are positive, responsive, and cooperative.

- Some evidence indicates that children's early ability to regulate their behavior is related to later social and cognitive competence.

The Evolution of Prosocial and Altruistic Behaviors

- **Prosocial behavior** begins very early; helping, sharing, and exhibiting emotional reactions to the distress of others appear in the first and second years of life. **Altruism** may also appear quite early.

- Parents influence the emergence of **altruistic behavior** by their direct teaching in "distress" situations, by providing models, and by arranging for opportunities to behave in prosocial ways. Opportunities for children to take responsibility appear to lead to increased altruistic behavior. Similarly, role playing and **empathy** both contribute to the development of altruism and helping behavior.

- Girls tend to be more prosocial than boys, but gender differences depend on the type of prosocial behavior being expressed. Such differences are largest for expressions of kindness and consideration.

- Evidence of helping and sharing behavior in infra-human animals leads some scientists to argue that evolution has prepared both humans and animals for prosocial behavior.

- Environmental factors, including the family, the mass media, and general cultural influences, help shape prosocial and altruistic behaviors, but children probably learn such behaviors most often from modeling parental behaviors.

- Children's **prosocial reasoning** evolves over time through a number of stages, including **hedonistic reasoning** and **needs-oriented reasoning**, as values and norms become increasingly internalized.

The Development of Aggression

- **Aggression** undergoes important developmental shifts: Younger children show more **instrumental aggression**, whereas older children display more person-oriented or **hostile aggression**. Children's ability to correctly infer intent in others—which varies among individual children—may account, in part, for these shifts. **Proactive aggression**, which is used to dominate another person, decreases across development more than **reactive aggression**, which occurs in response to being attacked.

- The expression of aggression changes over time, becoming more verbal as children mature, but the amount and quality of aggression remain fairly stable. Clear gender differences in aggression are evident, with boys instigating and retaliating more than girls. Girls are more likely to use **relational aggression** than boys, who are more likely to use physical aggression. Aggression is moderately stable over age for both sexes.

- Certain parental disciplinary practices, especially ineffectual and erratic physical punishment, contribute to high levels of aggression in children. Lack of parental monitoring of children is another contributor to later aggressive behavior or even serious delinquency.

- Biological influences on aggression include genetic, temperamental, and hormonal factors. All of these factors find expression in interaction with the environment.

- Association with deviant peers can increase the possibility that a child will engage in aggressive or delinquent activities. Poverty and high-crime neighborhoods can also promote aggressive behavior.

- **Catharsis** theory, the belief that behaving aggressively against a safe target can reduce aggression, has been seriously challenged by research evidence. Strategies that involve cognitive modification may be more successful. Some aggressive children who are **socially unskilled** may be helped to learn more prosocial behaviors through teaching them how to read others' behavior more accurately and encouraging them to be more sensitive to the views and feelings of others.

- Increasing children's awareness of the harmful effects of aggression is an effective control technique, as are eliciting cooperation and improving the problem-solving skills of aggressive children.

EXPLORE AND DISCUSS

1. Morality has behavioral, emotional, and cognitive components. When a child is confronted with a moral problem, how do you think each of these components comes into play?

2. Altruistic behavior involves helping or assisting others. Do you think acting in this manner has a positive effect on the actor? On the person receiving the help? Explain your answers.

3. Violence in schools has received a great deal of attention in the mass media. How can we explain school shootings? And what do you think we, as a society, can do to prevent such tragedies in the future?

Donald Martin (20th Century). *Stripes.*

15.

Developmental Psychopathology

Throughout the first 14 chapters of this book, we have focused on the development of the normal child. In this chapter, we turn to an intriguing but often painful and poorly understood area of development: psychological disorders of childhood. Shifting our focus from the normal to what is considered abnormal, we pursue an understanding of why some children develop problems that require special treatment and intervention. We address such questions as: What is "abnormal"? How have psychologists defined abnormality? What is unique about a developmental approach to psychopathology? How do risk factors, vulnerabilities, and protective processes interact to promote or protect against the development of abnormal behavior? How should we classify the psychological disorders of childhood?

Some of the psychological disorders we discuss are not uncommon; others are relatively rare. Problems such as attention deficit/hyperactivity disorder, in which children appear unable to control their own behavior and are excitable, in constant motion, and generally disruptive, are fairly widespread. Problems such as autistic disorder, in which children evidence extreme disturbances that invade many spheres of functioning, are, fortunately, relatively rare.

In discussing these and other disorders, we ask what causes these problems and how we can treat them effectively. We also consider efforts to prevent children from developing serious psychological disturbances. To introduce you to the topics of this discussion and to illustrate the range of problems that children can exhibit, we offer the following brief case studies.

Victor: Victor had always been a handful. As an infant, he cried frequently, woke up at all hours, and soon gave up his afternoon nap in favor of exploring tabletops and other forbidden territories. As a toddler, he raced around from dawn until dark, always seeming to run when others walked. When he was 4, one of his favorite games was scrambling onto the roof of the family car and fearlessly diving off into his father's tired arms. During times like these, Victor's parents would try to discipline him by reasoning with him, but that strategy rarely worked. Instead, they would tolerate—and often secretly enjoy—his antics until they reached their limit, at which point they found it necessary to simply force Victor to comply. Although Victor exhausted them,

his parents never considered him to have a real problem—until he started school. At the end of first grade, Victor's principal called his parents in for a conference. The principal told them that Victor wasn't paying attention in class, was consequently falling behind in his work, and required more supervision than his teacher said she could give. In addition, his antics in the classroom were distracting other children and disrupting the entire class. The principal suggested that Victor's parents talk to their pediatrician about how to change Victor's behavior before he started the second grade. If not, the school was going to consider placing Victor in their "resource room" next year—a special class for "emotionally disturbed" children.

Emily: Emily was beginning to worry her mother. She was a very well behaved and helpful 12-year-old, but to her mother, Emily seemed unhappy. She really didn't have any close friends, and her mother wondered why the phone wasn't constantly ringing for Emily as it had for her when she was Emily's age. To her mother, Emily seemed to spend too much of her time alone in her room and not enough time socializing. More than that, her mother was concerned about Emily's schoolwork. Her straight As in sixth grade had slipped down to mostly Bs and even one C for the first term in her new junior high school, and Emily had dropped out of the one thing that her mother thought she really seemed to enjoy—orchestra. Her mother wanted to talk with Emily about how she was feeling, but when she tried to approach her, Emily got angry at her mother's "bugging her" and ran to her room in tears. Her mother blamed Emily's unhappiness on Emily's father and their divorce 6 years earlier. But what could she do about that now?

Pauli: Pauli was becoming a source of grave concern to his parents. At age 3, he had not yet spoken his first word, and they could not ignore his unusual behavior. He spent hours every day sitting and spinning a top that he had played with since he was 2, and he became violently upset if the toy was taken away from him. Pauli showed no interest in other children and would jerk away from his mother or father if they tried to give him a hug. Even as an infant, Pauli had resisted being held and stiffened at physical contact, and his mother could not remember a time when they had really cuddled. She commented that holding Pauli was more like holding a log than a baby since he did not mold or cling to her shoulder the way most babies do. His rejection of his parents didn't seem to be one of anger; rather, it almost seemed as if it was physically painful for Pauli to be touched by someone. Although Pauli had been an exceptionally good baby, his failure to speak and his endless repetitive play gradually became more distressing to his parents. The pediatrician's calm reassurances when Pauli was younger had now ceased, and he suggested that Pauli be taken for an evaluation at a special hospital for exceptional children in a city 200 miles away. Pauli's parents were frightened by this possibility. Would they be asked to leave him at the hospital, and if so, for how long?

All three of these children are exhibiting behavior that concerns their parents. Victor's loving parents could tolerate and even appreciate his boundless energy, but his uncontrolled activity is causing trouble for him, his teacher, and his classmates in school. Does Victor have a special problem that differentiates him from his peers and may require special attention? Should he be placed in a special classroom? His teacher seems to think so. As for Emily, her apparent unhappiness may be a problem, but we don't really know how she feels about herself and her life. Is she feeling depressed, helpless, and angry with her mother and father for getting divorced? Or is she going through a "stage," feeling confused and lonely as she enters puberty? Perhaps Emily is simply experiencing the normal feelings of a quiet girl who is going through a transition to a new school. Of the three children, Pauli is exhibiting the most disturbing behavior. But why is he behaving in this unusual manner? Is Pauli suffering from some sort of an emotional problem, or is he perhaps mentally retarded? We will meet Victor, Emily, and Pauli again as we explore the complexities of developmental psychopathology.

THE DEVELOPMENTAL APPROACH TO PSYCHOPATHOLOGY

When a child appears to be experiencing unusual psychological distress, to understand and help this young person we need to invoke principles of what is called developmental

psychopathology. *Psychopathology* is the study of disorders of the *psyche*—that is, of the mind. **Developmental psychopathology**, which combines the study of psychopathology with the study of development, involves the investigation of the origins, course, changes, and continuities in disordered or maladaptive behavior over the individual's life span. The principles of developmental psychopathology are applicable to people of all ages, for people change and go on changing as long as they live. Life transitions—such as graduation, a new job, marriage, childbirth, divorce, and retirement—all have their effects on people's functioning and have the potential to create shifts in developmental trajectories. Here, of course, we are concerned with the usefulness of these principles for understanding the special influences that biological, emotional, social, and environmental factors have on the young developing person.

The unique approach of *developmental* psychopathology is embodied in four basic principles (Cicchetti & Toth, 2006; Cummings et al., 2000). First, because child disorders occur in a developing organism, *we must take into account the role of development in interpreting the symptoms, searching for the origins, and understanding the course of any given disorder.* The frequency and patterns of symptoms in behavior disorders vary across the course of development. For example, children may suffer depression as they move from preadolescence to adolescence. Although there are no gender differences in the incidence of depression among preadolescents, depression increases notably in adolescent girls. Depression in young children is typically characterized by social withdrawal and a *dysphoric* (unhappy, dejected, anxious, and/or self-doubting) mood. However, childhood depression is often masked by other, more strictly behavioral symptoms such as hyperactivity, bed-wetting, learning problems, and antisocial behavior. Children—especially those between the ages of about 8 and 11—do not manifest the general slowing of mental and physical activity or the motivational deficits that adults with depression typically do (Gelfand & Drew, 2003). In adolescents with depression, suicidal thoughts, which are quite uncharacteristic of younger children, begin to appear, and the depressed adult's symptoms of low self-worth, guilt, depressed mood, negative self-attributions, and inactivity also emerge (Goodman & Gotlib, 2002; Klein & Wender, 2005). The increase in depression and suicidal behavior at adolescence is probably associated with the onset of pubertal changes, advances in cognitive development, and the many stresses and adaptive challenges young people encounter in this developmental period (Hammen, 1997, 2002).

Second, *psychopathology in a child must be viewed in relation both to children's normal development and to the major developmental tasks and changes that occur as children mature.* By definition, psychopathology involves deviations from normal behavior, and developmental psychopathology involves deviations from normal attainments of people of the same age as the person under consideration. A critical issue is how to distinguish between developmental disruptions within the normal range and those reflecting more serious disordered behavior (Rutter, 1996, 2003). As we will see, all children have some problems at some times in their lives, and at some points in development, certain problems occur with such frequency as to be regarded as normal. For example, although temper tantrums would be viewed as somewhat deviant in adolescents, they are common in 2-year-olds.

Third, *developmental psychopathology includes the earliest precursors of disordered behavior.* Although psychopathology is less clearly defined and less stable in younger children than in adults, early behaviors are often associated with later disturbances. Two such warning signs are noncompliant behaviors and rejection by peers. These two precursors of later antisocial behavior may also be

developmental psychopathology The investigation of the origins, course, changes, and continuities in disordered or maladaptive behavior over a person's life span.

Depressive episodes are not uncommon in teenage girls and may well be linked to the changes of puberty and the stresses and challenges of adolescence. When depression lingers and is associated with expressions of guilt, low self-worth, or suicidal ideation, however, knowledgeable adults need to intervene to prevent the adolescent from sinking into self-destructive behaviors such as the abuse of drugs.
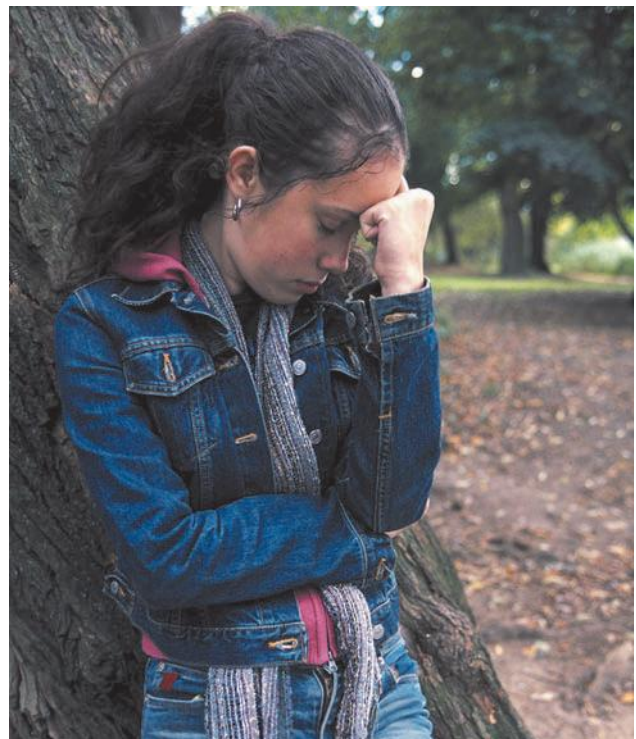
related. Young children who are resistant, coercive, nonconforming, and confrontational with parents are also likely to be insensitive, unskilled, aggressive, and hence, unaccepted in peer relations. Peer rejection eventually may drive children to associate with a deviant peer group and to become involved in antisocial behavior. Thus, although early noncompliance and rejection by peers are not necessarily pathological, they can be associated with more serious later conduct disorders such as stealing, setting fires, drug abuse, and physical violence (Dishion et al., 2000; Gelfand & Drew, 2003).

The fourth principle is that *there are multiple pathways to both normal and abnormal behavior over the course of development* (Cicchetti & Toth, 2006). Many factors—genetic, environmental, and experiential—interact to deflect a child either into a deviant trajectory or back into a normal developmental pathway. To the degree that we can identify risk factors of all sorts in the young child, we may be able to prevent children from following an abnormal path.

What Is Abnormal?

Defining abnormal psychological behavior is no easy task. Many cultural, societal, ethnic, and personal values affect what we consider normal and abnormal, and all of these values vary across regions, nations, and subcultures within nations. However, because some behavior is so unusual that it causes great distress either to the child or to those with whom he or she interacts, or places one or more people in danger, we need at least a working definition. We begin with the medical approach to defining and classifying psychological disorders. Then we look at two common views: abnormality as different from most common behaviors and abnormality as different from what we view as ideal behavior. We then consider the fact that disorders in children are often judged by the adults who are closest to them. And finally, we consider how likely it is that a childhood disorder will continue into adulthood.

The Medical Model

We can borrow from medical science—more specifically, the field of psychiatry—ideas about the causes and treatments of emotional problems. Unfortunately, however, this leads many people to believe that such behaviors reflect some form of *disease* of the mind analogous to a physical illness. Indeed, the medical model generally assumes that the psychological disorder—like a physical disease—resides within the individual and results from abnormal physiological or *intrapsychic* (mental) processes. Most child psychologists believe that the medical model is insufficient for explaining abnormal child behavior. They argue that what we call developmental psychopathology is better thought of as a collection of problems in living that are caused by environmental circumstances. At the same time, however, it is important to recognize that problems such as *autism* and *attention deficit/hyperactivity disorder* have genetic roots, even though the expression of these and other disorders may depend on environmental conditions (Pennington, 2005).

Abnormality as Deviation From the Average

The term *abnormal* literally means "not normal"; therefore, one way of defining abnormality is to view as abnormal any behaviors or feelings that differ in some degree from the average. This method of defining abnormality is referred to as the *statistical model*. Although there are problems with this definition of abnormality, it is often used as a guide to what constitutes deviance. For example, part of the definition of mental retardation offered by the American Association of Mental Retardation (AAMR) is that children are retarded if their IQ test scores are two standard deviations below average.

BOX 15-1

Perspectives on Diversity

THAI AND AMERICAN VIEWS ON CHILD BEHAVIOR PROBLEMS

Cultural values may determine whether adults consider a child's psychological problems serious enough to require professional help. John Weisz and his colleagues (Lambert et al., 1989; Weisz et al., 1988, 1995) investigated adults' concern about overcontrolled and undercontrolled child behavior problems in Thailand and the United States. The teachings of Thai Buddhism propose that some unhappiness in life is inevitable, that all things change for the better, and that an individual's behavior on any given occasion is not reflective of an unchanging personality.

Americans view children's problems as more serious. In schools, colleges, and universities and every day in the media, Americans are exposed to theories and ideas about child psychology, child-rearing, and deviant behavior. In Weisz's research, parents, teachers, and psychologists in the United States and Thailand read vignettes describing two children, one with symptoms of overcontrolled behavior (e.g., shyness, fearfulness,

depression, worrying, and dependence) and the other with problems of undercontrol (e.g., aggression, cruelty, disobedience, and lying). The adults were asked to rate each child on the seriousness of the problems, their level of concern about the problems, whether the children's behavior would improve over time, and which child had a greater need for professional help.

As Figure 15-1 shows, consistent with their beliefs, Thais rated both children's behaviors as less serious and worrisome and more likely to improve than the U.S. adults judged them. Cross-national differences were less extreme in psychologists' responses than in the responses of parents and teachers, perhaps because their professional training exposed them to these childhood problems more often. Childhood psychopathology is to some extent in the eye of the beholder, and the beholder's perspective is modified by cultural context.

(a)
(b)
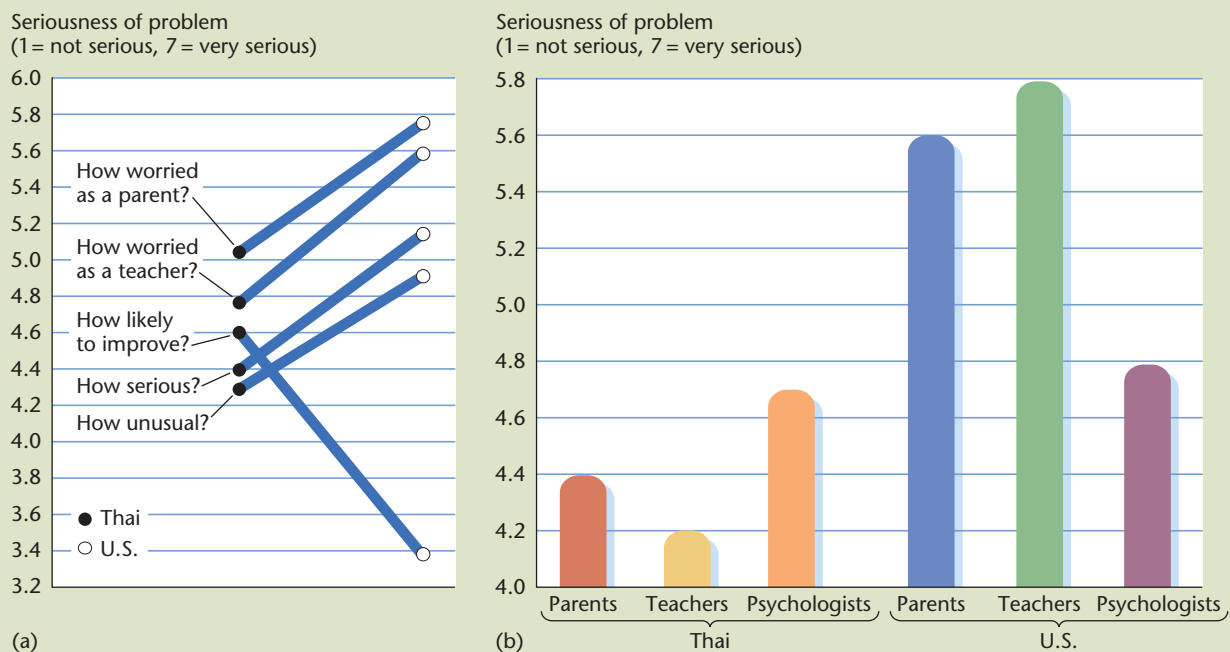
Figure 15-1

Are Thai children's problem behaviors less of a problem?

Rating the seriousness of children's problems (several behaviors combined) on a scale of 1 to 7 (from "not serious " to "very serious"), in general, Thai adults thought such behaviors less problematic than did American adults (a). Asked "How serious is this child's problem?" Thai parents and teachers differed from U.S. ones, but in both countries, psychologists' ratings were similar (b).

Source: Weisz et al., 1988.

On the Wechsler Intelligence Scale for Children–Revised, a score of 100 is average, and one standard deviation is equal to 15 points; by this rule, an IQ score lower than 70 indicates mental retardation.

The statistical model may seem appealing because it is so clear-cut, but things are not so simple. Although it may work for intelligence, which is measured on a numerical scale and can be either lower than normal or higher, it doesn't work for a concept like normality-abnormality. There is no statistically measurable average. Moreover, deviation from a mean can go in either direction. By this rule, if we were to consider an IQ of 100 "normal," we would have to consider scores of both 69 and 131 "abnormal." Most people would be reluctant to call superior cognitive functioning a sign of abnormality! Another problem with the statistical model is that it gives us no guidance as to how much of a difference is abnormal and under what circumstances differences matter. Why choose two standard deviations below the mean to determine mental retardation—why not one? or three?

Abnormality as Deviation from the Ideal

An alternative to the statistical model is to define abnormality as a deviation from the ideal. This model identifies an ideal healthy personality and claims that deviations from this ideal are abnormal. The main problem with this approach is the question of how to define the ideal healthy personality. Personality theorists such as Freud have suggested guidelines for the ideal personality, but who is to say they are right? What do you consider ideal? Are you willing to say that anyone who falls short of this ideal is abnormal? Are you prepared to accept someone else's judgment of what ideal functioning is? Your parents' definition perhaps? The answers to these questions are clearly in doubt. To define such an ideal seems too big a task for anyone, no matter how brilliant or how highly regarded.

Elements of this concept of abnormality, however, are seen in our definitions of psychopathology. In Western cultures, people are expected to work hard, to love forever, and to be happy in achieving these two goals. When someone falls short of these cultural criteria, we become concerned. However, in Eastern cultures, other ideals may prevail. Box 15-1 discusses some differences in how adults in the United States and Thailand perceive the significance of childhood behavior problems. This cross-cultural study demonstrates clearly that implicit ideals affect cultural definitions of abnormality.

The Social Judgment of Child Psychopathology

Consider another brief case history.

> Tom lives with his aunt and cousin and is enrolled in elementary school. He often skips school, however, because he hates it, and he frequently sneaks out of the house at night to meet friends. Just before he ran away from home, Tom was gloomy and felt desperate. He was a forsaken, friendless boy, he said; nobody loved him. When they found out what they had driven him to do, perhaps they would be sorry. He had tried to do right and get along, but they would not let him. They had forced him to it at last; he would lead a life of crime.

What can you conclude from this very brief account about the normality or abnormality of Tom's behavior? Does Tom differ enough from the average to be considered abnormal according to the statistical model? Certainly, he deviates from many people's ideals, including, we might presume, the ideals of some of the people with whom Tom interacts. Put yourself in the position of a psychologist who has been asked to evaluate Tom's general adjustment. Are you suspicious that he is exhibiting some form of developmental psychopathology, or are you more inclined to dismiss his behavior as nothing to worry about?

In weighing your decision, you should know that Tom is actually Mark Twain's Tom Sawyer. At the time Twain created this character in 1876, Tom was certainly not meant to be psychopathological or even abnormal. Just the opposite: Tom represented the ideal all-American boy. He was hardly a candidate for psychotherapy! But taken out of context and viewed by today's standards, Tom seems quite deeply troubled as he proposes to leave his home, quit school, and take up a clearly deviant lifestyle. Had someone with a degree of authority heard his thoughts, he might well have been judged abnormal and remanded for treatment or rehabilitation. Clearly, something other than a child's behavior in any given situation affects people's social judgments as to what constitutes abnormal behavior.

In general, people's view of abnormality depends on their individual and cultural values. What is abnormal are those behaviors, thoughts, and feelings that a group of individuals agree are deviant. Although this view may be preferable to others, you can easily see that it, too, has problems. For example, different groups of people use different criteria to define abnormality, and these criteria may conflict.

Because children rarely refer themselves for formal help but rather are identified by an adult as disturbed and in need of the attention of mental health professionals, psychologists must constantly be alert to factors other than the child's behavior itself. Thus, therapists must always ask themselves: Has this child really a problem or has the adult who has referred him to me a distorted view of the child for some reason? Three sets of factors that may subtly influence a referring adult's perception are the characteristics of the child, the characteristics of the adult, and contextual influences.

CHARACTERISTICS OF THE CHILD   Parents and other adults are more likely to perceive behavior as deviant if it occurs in boys, in children who have been temperamentally difficult infants, in unattractive children, and in children with a history of other forms of deviance (Cummings et al., 2000; Rothbart & Bates, 2006). In addition, people are less likely to judge a behavior displayed by a socially skilled child as abnormal than they are if the child is socially unskilled (Gelfand & Drew, 2003). One reason that Tom Sawyer would not likely be judged to have a psychological problem is that he has other, positive qualities. He's smart and attractive, and although his Aunt Polly often tweaks him by the ear, not even she can get really angry with him.

CHARACTERISTICS OF THE REFERRING ADULT   Characteristics of the adult who identifies a child as disturbed also determine whether the opinion should be trusted. Anyone, including teachers and health professionals, can express a view about a child that, although it may reveal something real about the child's behavior, also says something about the adult. Although it might seem that parents would know their children better than anyone, not uncommonly parents have a distorted view of their children's behavior and of their children's need for psychological help. Parents who are depressed or abusive are likely to report their children's behavior as more negative than observations of the child's actual behavior suggest (Cicchetti & Toth, 2006; Hammen, 2005). In one study, researchers examined abusive parents' attributions about the causes of their children's positive and negative behaviors (Bauer & Twentyman, 1985). They showed mothers a series of photographs of either their own child or an unfamiliar child acting in a variety of social situations in which children were either (a) transgressing against each other, (b) engaged in a play situation that had a destructive outcome, or (c) involved in a competitive situation that had an ambiguous outcome. They then asked the mothers questions that required them to evaluate the children's behavior and also asked them to explain why they thought the children acted as they did.

Consistent with other research (Azar, 2002), abusive mothers expressed negative expectations of their own children. They attributed their children's transgressions or failures to internal, stable causes; that is, they saw them as reflecting continuing traits and thus as likely to be repeated. On the other hand, when their own children were successful and when other children were the transgressors or failed at a task, these

mothers attributed the other children's behaviors to external, unstable causal factors. They implied that these behaviors were specific to the particular situation and thus unlikely to be repeated. Nonabusive mothers offered almost the exact opposite pattern of causal explanations: They emphasized their children's positive attributes as leading to success, and they suggested that either special circumstances or unusual behaviors were the causes of their children's transgressions.

These findings indicate that adults' judgments of children's behavior involve complex processes. It is not enough for a therapist to help a parent see a child as behaving in a more positive way; the parent also must attribute the child's behavior to internal, stable causes. For example, if a parent who has referred a child to a psychologist concludes that the child is doing better "only because he is in therapy," the parent is unlikely to maintain a positive view of the child. Ultimately, the goal must be for the parent to see the child as doing better as a result of internal, stable factors: It's "because he's basically a good kid."

THE CHILD'S ENVIRONMENT The context in which adults observe a child's behavior also influences their judgments of psychopathology. They may judge the same behavior differently according to the demands of different situations. Victor's parents judged his inattentive and overactive behavior as tiresome, but they accepted it in their home. But when Victor began school, the demands and stricter standards of the classroom context led teachers to judge his behavior as abnormal. Victor's behavior did not change, but the setting in which it occurred did.

Contextual influences on the evaluation of children's psychological adjustment include still other factors. For example, a child's social background, race, and prior behavior can create contexts that influence the way adults judge a behavior. Such factors often lead people to tag children with value-laden labels: "retarded," "a child from a broken home," "delinquent," "high-risk." Unfortunately, such labels can create a context in which others perceive and respond to the child's behavior in a way that has adverse consequences. When arrested for similar offenses, for example, lower class minorities are more likely than middle-class whites to be sent to court or juvenile hall (Dodge et al., 2006; Moeller, 2001).

Continuity Over Time

Whether or not a particular behavior problem is viewed as abnormal also depends on the child's age and the probability that the behavior will continue over time and be manifested in some form of adult disorder (Rutter, 1996). Some problems, such as bed-wetting, thumb-sucking, temper tantrums, and tics, decline with age; others, such as nail-biting, increase from early childhood to adolescence; still others, such as disturbing dreams and nightmares, peak in preadolescence at about age 10 and then decline (Gelfand & Drew, 2003). Table 15-1 displays some problem behaviors that, when they occur at the ages indicated, are fairly common among normal children and thus not necessarily indicative of serious trouble. However, some problem behaviors are cause for concern. As we will see, childhood disorders such as hyperactivity, autism, and overly aggressive and antisocial behaviors are more likely to be associated with later adult dysfunction (Dodge et al., 2006; Gelfand & Drew, 2003).

Caspi and colleagues (1987) studied the stability of behavior in children who at age 8 had been identified as having an irritable social interaction style, manifested in temper tantrums, explosiveness, and verbal abuse. Boys who were irritable school-age children were, 30 years later, undercontrolled, moody, and unsociable. As adults, they were also less dependable, less ambitious, and less productive, as reflected in erratic work patterns and downward occupational mobility. For both males and females, early explosive, ill-tempered behavior was associated with marital problems and divorce and, for women, with marriage to a man of low socioeconomic status and with an irritable, inept parenting style.

Table 15-1　Common problem behaviors of children and adolescents

Problem Behavior	1.5–2 years	3–5 years	6–10 years	11–14 years	15–18 years
Inattentiveness	x				
Demanding attention constantly	x	x			
Refusal to do things when asked	x	x			
Overactivity	x	x	x		
Specific fears	x	x	x		
Temper tantrums	x	x	x	x	
Negativism		x			
Oversensitivity		x	x		
Lying		x	x		
Jealousy			x	x	
Excessive reserve			x	x	
Moodiness				x	
School achievement problems			x	x	x
Skipping school					x
Cheating on exams					x
Depression					x
Drinking					x
Smoking					x
Drug misuse					x
Early sexual activity					x
Trespassing					x
Shoplifting					x
Other minor law violations					x

Source: Adapted from Gelfand, Jensen, & Drew, 1997.

CLASSIFYING CHILD PSYCHOPATHOLOGY

Given our many problems in defining abnormal child behavior, it is not surprising that psychiatrists (physicians who specialize in psychological disorders), psychologists, and others disagree on how to classify the different forms of developmental psychopathology. Until quite recently, childhood psychological problems were viewed as variations of recognized adult disorders, and the diagnostic categories developed for adults were applied to children as well (Achenbach, 1995). The irony of viewing disturbed children as munchkins with adult problems is striking, for most theories of mental and emotional disturbance view psychological functioning during adult life as a product of child development!

Although many authorities argue that the seeds of abnormal development are sown in childhood, researchers and others have spent far less time studying abnormal behavior in children than adult psychological disorders. Recent years have seen an increasing interest in the psychological problems unique to childhood. We look next at two important means of assessing and classifying childhood psychopathology: the diagnostic approach and the empirical method.

The Diagnostic Approach

diagnosis The identification of a physical or mental disorder on the basis of symptoms and of knowledge of the cause or causes of the disorder and its common course. A diagnosis may also include information about effective forms of treatment.

etiology In medicine and psychiatry, the cause or causes of a specific disorder.

The diagnostic approach to assessing and classifying psychopathology is rooted in the medical tradition. In medicine, a **diagnosis** is useful or valid if it conveys information about the **etiology**, or cause, of a disorder, about its likely course, or about the kind of treatment likely to be effective in curing or alleviating it. Because the classification of childhood psychopathology is still in its infancy, many diagnostic categories devised to characterize specific disorders are based largely on description—including such things as patterns of behavior and specific kinds of thoughts and feelings—and few can make firm statements about either etiology or treatment.

The diagnostic classification system most widely used in the field of psychiatry has been compiled by the American Psychiatric Association (APA). The current *Diagnostic and Statistical Manual* (American Psychiatric Association, 2000) is the fourth classification system that APA has developed (it is commonly referred to as *DSM-IV*). Table 15-2 displays some examples of *DSM* categories that relate specifically to childhood disorders. This section has grown considerably over the more than 50 years since *DSM-I* was published in 1952, a sign of the increased interest in psychological disorders of childhood. Today, *DSM-IV* contains 43 diagnostic categories applicable to children, 41 more than were included in *DSM-I*. Inasmuch as this change reflects a trend away from viewing children as little adults, it is to be applauded.

Table 15-2   Some examples of *DSM-IV*'s "Disorders Usually First Diagnosed in Infancy, Childhood, or Adolescence"

Mental Retardation	*Attention-Deficit and Disruptive Behavior Disorders*
Mild mental retardation	Attention deficit/hyperactivity disorder
Moderate mental retardation	Conduct disorder
Severe mental retardation	Oppositional defiant disorder
Profound mental retardation	*Feeding and Eating Disorders of Infancy or Early Childhood*
Learning Disorders	Rumination disorder (regurgitation and rechewing of food)
Reading disorder	
Mathematics disorder	*Tic Disorders (stereotyped motor movements or vocalizations)*
Disorder of written expression	
Motor Skills Disorder	Tourette's disorder (multiple tics)
Developmental coordination disorder	Chronic motor or vocal tic disorder
Communication Disorders	*Elimination Disorders*
Expressive language disorder	Encopresis (incontinence of feces)
Phonological disorder (difficulties in articulating speech)	Enuresis (bed-wetting)
Stuttering	*Other Disorders of Infancy, Childhood, or Adolescence*
Pervasive Developmental Disorders	Separation anxiety disorder
Autistic disorder	Selective mutism
Rett's disorder (usually associated with severe or profound mental retardation)	Reactive attachment disorder of infancy or early childhood
Childhood disintegrative disorder (usually associated with severe mental retardation)	Stereotypic movement disorder

Source: Based on American Psychiatric Association, 2000.

DSM-IV is not without its critics, however (Campbell, 1998, 2002). Perhaps its biggest problem is that many of its diagnostic categories are neither valid nor reliable (Beutler & Malik, 2002). **Diagnostic reliability** is a measure of how often two or more clinicians arrive independently at the same diagnosis of a particular disorder. Without reliability, no system of classification can be valid. If two psychologists cannot agree, for example, on whether a child is clinically depressed, we cannot learn much about depression in childhood. If psychologist Smith decides that Emily, one of the children we discussed at the beginning of the chapter, suffers from depression, but psychologist Jones determines that Emily is merely experiencing the normal ups and downs of preadolescence, we learn nothing.

In one study, researchers found that diagnosticians within a large hospital and medical center agreed on a diagnosis of depression quite well, but when diagnostic results in sites across the United States were compared, agreement was poor (Keller et al., 1995). Even when a physician or other professional diagnoses the same person on two occasions, 6 months apart, the two diagnoses may differ (Carson, 1991). One study found that clinicians diagnosing depression in a child agreed only about 40% of the time, far below an acceptable level of diagnostic reliability (Cantwell et al., 1979). On the other hand, the diagnostic reliability of some of *DSM-IV*'s categories—such as the diagnosis of attention deficit/hyperactivity disorder—is acceptably high. The psychiatric profession is endeavoring to improve the reliability of the *DSM*'s diagnostic categories and has developed training guides for diagnosticians (Ottosson et al., 2002).

diagnostic reliability A measure of how often two or more clinicians arrive independently at the same diagnosis of a particular disorder.

The Empirical Method

An alternative to the diagnostic approach is the empirical or rating-scale method (Achenbach, 1997; Achenbach & Rescorla, 2007). Using this method, an adult who is familiar with a child who displays signs of emotional disturbance—usually, a parent or a teacher—rates a large number of problem behaviors according to whether and to what degree the child displays the behaviors. Investigators then use statistical techniques to determine which problem behaviors are associated with one another. There is considerable overlap among the classifications arrived at by the diagnostic and the empirical methods, but there are also many disparities (Achenbach, 1995). Researchers may also have peers rate the likelihood that other children will engage in risky behaviors (Tinsley et al., 1997). Because peers influence children's risky behavior, this approach is a particularly useful way of identifying children and adolescents at risk for harmful behaviors such as smoking and using alcohol and other drugs. Moreover, this empirical approach has been found to be useful for describing child problems in other ethnic groups in the United States as well as a variety of other cultures (Rescorla et al., 2007, 2008).

Both classification methods generally agree on the broader, major categories, such as "mental retardation," but often disagree—both with each other and within their own systems—on narrower subcategories, such as "mild mental retardation" and "moderate mental retardation" (see Table 15-2). The finer the distinction one tries to draw between collections of symptoms and behaviors, the more difficult the task. If symptoms and behaviors were always exactly the same, with enough study, it should be possible to draw these distinctions once and for all. But human beings are infinitely variable—so the work goes on!

SOME PSYCHOLOGICAL DISORDERS THAT AFFECT CHILDREN

It is useful to discuss some representative child disorders in terms of the degree to which they reflect the nature of the control children exert over their behavior. In

undercontrolled disorders
A group of psychological disturbances in which a child appears to lack self-control and to act-out in a variety of ways, through such behaviors as noncompliance, disobedience, and aggression.

overcontrolled disorders
A group of psychological disturbances in which a child appears overly controlled, withdrawing from others, lacking spontaneity, and generally appearing to be not a happy child.

comorbidity The co-occurrence of two or more problem behaviors.

pervasive developmental disorders Childhood disorders characterized by gross deficits in many areas of cognitive, emotional, and social development that are linked with severe and pervasive impairment of social interaction and communication skills.

undercontrolled disorders, the child fails to control behavior in such a way as to suit the demands of a given environment. Examples of undercontrolled behaviors include noncompliance, disobedience, rule violation, and aggression. Although these behaviors hurt the child, they are initially most disturbing to other people around the child. Because undercontrolled behaviors are defined largely by this negative impact on others, and because most childhood psychological disorders are defined by adults' social judgments, it is not surprising that undercontrolled behavior disorders are the most frequently reported of all the psychological problems of childhood. In this section, we discuss two of these types of disorders: conduct disorders and attention deficit/hyperactivity disorder.

In contrast to undercontrolled disorders, **overcontrolled disorders** tend to have a more adverse effect on the child, who seems to withdraw from others, lack spontaneity, and in general, not be the "happy child" every parent wants. Various negative emotions such as fear, anxiety, and sadness characterize such children, who seem restrained and overly controlled in the way they relate to others. *Phobias* (excessive fears) may cause considerable discomfort for some children and their families; fortunately, research indicates that 80% of children's phobias disappear within 2 years, even without treatment (Gelfand & Drew, 2003). (Table 15-3 lists some fears that are common at different stages of normal development.) However, some fears and phobias are more long lasting, persisting across the life span. These include fear of heights and fear of physical illness. Anxiety disorders characterized by a general apprehensiveness and low self-confidence also can last into the adult years (Ollendick & King, 1998).

As a representative of overcontrol, we will discuss childhood depression. This disorder is not listed in Table 15-2 because *DSM-IV* covers depression in childhood in its discussion of *Mood Disorders* in adults, as it also covers the expression in children of anxiety and phobias under the adult category of *Anxiety Disorders*. For several reasons, it is often difficult to identify overcontrolled problems in children. Because the definition of childhood psychopathology depends on an adult's social judgment, and because it is much more difficult for adults to evaluate children's inner feelings (e.g., sadness) than it is to judge their overt behavior (e.g., aggression), the diagnostic labels for overcontrolled disorders are often vague and controversial. It is also the case that undercontrolling and overcontrolling behaviors often occur together. For example, the child who acts-out and displays aggression may also experience depression and use drugs. So even though we discuss them separately, keep in mind that "bad things" often go together (Kim et al., 2003). **Comorbidity** is the term used to describe this co-occurrence of two or more problem behaviors (Pennington, 2005).

Although the problems of delinquency, hyperactivity, and depression are serious, some children exhibit even more marked forms of psychological distress that do not really fit under either the overcontrolled or undercontrolled designations. The term **pervasive developmental disorders** describes a collection of disorders characterized

Table 15-3

How children's fears wax and wane

Source: From Gelfand and Drew. *Understanding Child Behavior Disorders*, 4th ed. Copyright © 2003 Wadsworth, a part of Cengage Learning, Inc. Reproduced by permission. www.cengage.com/permissions.

Ages	Fears
0–12 months	Loss of support; loud noises; unexpected, looming objects; strangers
12–24 months	Separation from parent; injury; strangers
24–36 months	Separation from parent; animals, especially large dogs; darkness
36 months–6 years	Separation from parent; animals; darkness; strangers; bodily harm
6–10 years	Imaginary beings; snakes; injury; darkness; being alone
10–12 years	Social evaluations; school failure; thunderstorms; ridicule; injury; death
Adolescence	Peer rejection; school failure; war and other disasters; family issues; future plans (especially in boys)

by gross deficits in many areas of cognitive, emotional, and social development that are linked with severe and pervasive impairment of social interaction and communication skills (American Psychiatric Association, 2000). Children with these kinds of disorders are extremely disturbed. Although these disorders have sometimes been referred to as *psychoses* (broadly, disturbances in which the person's functioning is so maladaptive that he or she is said to be out of touch with reality), the unusual behaviors seen in these children are even more general and incapacitating than those in most psychoses.

Pervasive developmental disorders have often been confused with schizophrenia, a common and seriously incapacitating disorder that, like some of these disorders, is characterized by loss of contact with reality. However, schizophrenia is also characterized by hallucinations, delusions, and other kinds of thought disorders not found in the pervasive developmental disorders. In addition, these two kinds of disorder have very different ages of onset: The pervasive developmental disorders are evident in the first few years of life, whereas schizophrenia most commonly emerges in late adolescence or early adulthood. Schizophrenia is not found with any great frequency in children.

In this chapter, we discuss one of the most widely known pervasive developmental disorders, that of autistic disorder (also known as *early infantile autism* and *childhood autism*). Autism has been one of the most baffling of childhood disturbances, but as we will see, some progress has been made in treating the children who suffer from it.

Conduct Disorders

A **conduct disorder** is characterized by a repetitive and persistent pattern of behavior in which a child or adolescent violates the basic rights of others or major age-appropriate societal norms or rules (American Psychiatric Association, 2000). (See Table 15-4 for the *DSM-IV* description of conduct disorders.) Thus, it is a disorder of *undercontrol*. More than three times as many boys as girls are reported to exhibit conduct disorders (American Psychiatric Association, 2000; Moffit et al., 2001; Reid et al., 2002).

When rule breaking involves a violation not just of norms or others' rights but of the law, the youth is said to be *delinquent*. **Delinquency** is not a psychological term but is the legal designation for juvenile behavior that violates the law. Juveniles can be judged delinquent for two types of offenses. A youth may be charged with a

conduct disorder A disorder characterized by a repetitive and persistent pattern of behavior in which a young person violates the basic rights of others or major age-appropriate societal norms or rules.

delinquency Juvenile behavior in violation of the law.

Table 15-4

DSM-IV-TR diagnostic criteria for conduct disorder

Repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated, as manifested by the presence of three (or more) of the following criteria in the past 12 months, with at least one criterion present in the past 6 months:

Aggression to People and Animals

1. Often bullies, threatens, or intimidates others

2. Often initiates physical fights

3. Has used a weapon that can cause serious physical harm to others (e.g., a bat, brick, broken bottle, knife, gun)

4. Has been physically cruel to people

5. Has been physically cruel to animals

6. Has stolen while confronting a victim (e.g., mugging, purse snatching, extortion, armed robbery)

7. Has forced someone into sexual activity

Destruction of Property

8. Has deliberately engaged in fire setting with the intention of causing serious damage

9. Has deliberately destroyed others' property (other than by fire setting)

Figure 15-2

Young people and arrest rates for violent crimes by race

Beginning in the 1980s, arrests of youth aged 10 to 17 for violent crimes (robbery, aggravated assault, rape, or murder) peaked in the mid-1990s, and the rate of these arrests began to drop to a lower level than two decades ago for all racial groups.

Source: U.S. Department of Justice, 2005.

Juvenile Arrest Rates, by Race, 1980-2003
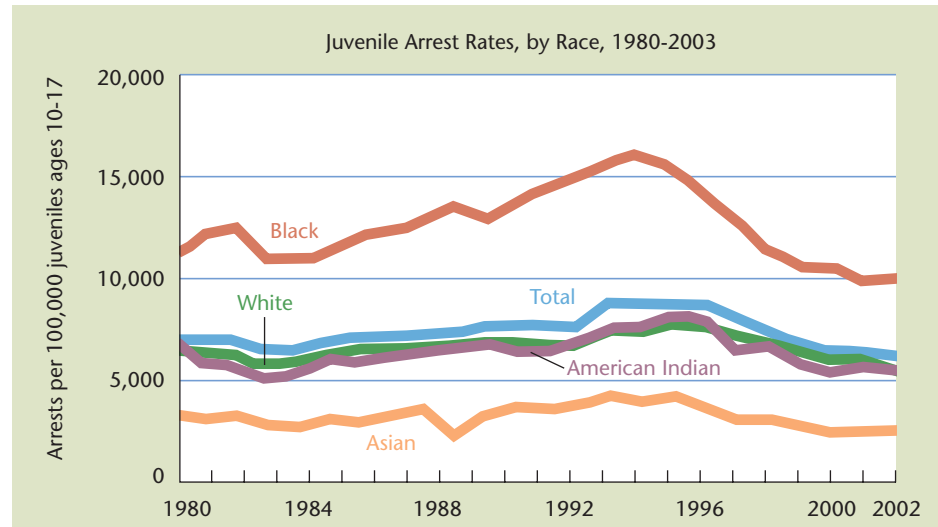
status offense   Illegal behavior in an underage offender.

criminal offense   Behavior that is illegal.

substance abuse   The excessive use of legal or illegal drugs in such a way as to interfere seriously with one or more important areas of functioning in life: work, intimacy with another, or general interpersonal and social relationships.

status offense, such as possession of alcohol, if she is under the age at which drinking is legal. **Criminal offenses** are illegal regardless of the age of the individual. Criminal offenses committed by juveniles accounted for 17% of all criminal arrests and 16% of arrests for serious violent crime in 1999 (Children's Defense Fund, 2001). The good news, however, is that the arrest rate for juveniles has dropped since 1995 for all racial groups (see Figure 15-2). The juvenile murder arrest rate has declined even more rapidly, dropping over 55% since the late 1980s (Children's Defense Fund, 2001).

DSM-IV considers *substance-related disorders* a category separate from the disorders diagnosed in childhood—largely because drug abuse is a serious and pervasive problem among adults. However, we discuss substance abuse here because, among children and adolescents, this problem—again, one of undercontrol—has been and continues to be the cause of much concern.

Substance abuse is the excessive use of legal or illegal drugs in such a way as to interfere with one or more important areas of functioning in life. Table 15-5 lists the *DSM-IV* criteria for a diagnosis of substance abuse. Nearly half of the students in the United States have tried an illegal drug before they graduated from high school (Johnston et al., 2007). However, trends in adolescents' use of both legal and illegal drugs are

Table 15-5

DSM-IV-TR criteria for substance abuse

Source: Reprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Copyright 2000. American Psychiatric Association.

A. A maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period:

   (1) Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to substance use; substance-related absences, suspensions, or expulsions from school; neglect of children or household)

   (2) Recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use)

   (3) Recurrent substance-related legal problems (e.g., arrests for substance-related disorderly conduct)

   (4) Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with spouse about consequences of intoxication, physical fights)

B. The symptoms have never met the criteria for Substance Dependence for this class of substance.
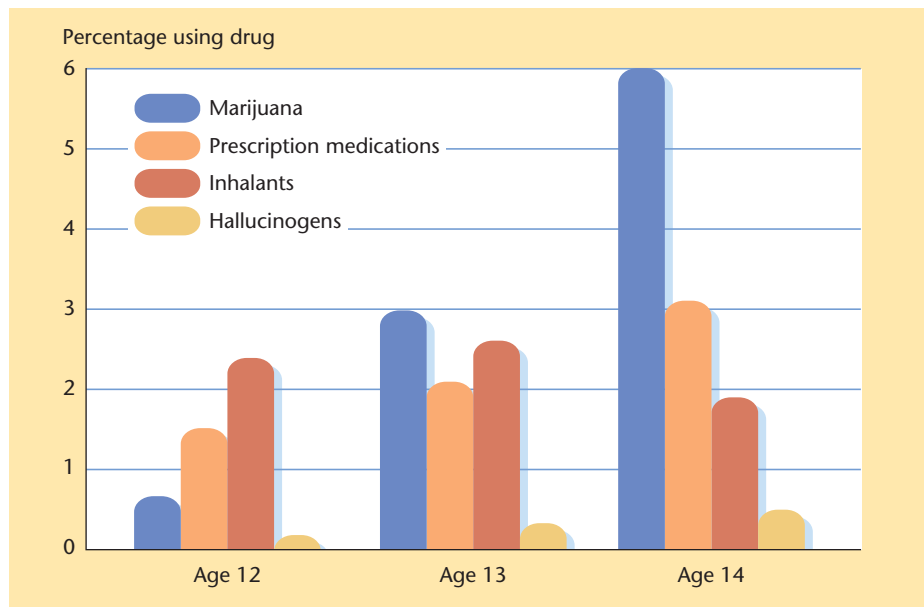
Figure 15-3

Young people's use of illegal drugs

According to one study, the percentages of adolescents who used drugs rose fairly steadily over the 3-year period of the study, although the proportion of teenagers who were users was still relatively low. Note that at 12, young people preferred inhalants, but by 13, their use of marijuana began to rise, becoming their favorite by the age of 14. Inhalants gradually declined in use between ages 13 and 14.

Source: Leshner, 2001.

declining, primarily in the use of alcohol and illicit drugs such as marijuana, cocaine, heroin, and hallucinogens. Between 2002 and 2004, drug use among 12- to 17-year-olds declined 9% overall, but a category that showed an increase was nonmedical use of prescription drugs. Young adults aged 18 to 25 had the highest rates of substance abuse (National Institute on Drug Abuse, 2006). Greater awareness of the harmful effects of drugs and better and more widely available treatment programs have probably contributed to the decline in drug use. A troubling trend is that those who use drugs may be starting at younger ages (Johnston et al., 1997). As Figure 15-3 shows, Leshner (2001) found that even 12-year-olds were likely to use drugs such as inhalants and that 13- and 14-year-olds were using marijuana. Among adolescents sampled in the National Survey on Drug Use and Health, boys were considerably more likely to drink regularly and to use illicit drugs than girls, but girls were just as likely as boys to smoke cigarettes. American Indian/Alaska Native youth had the highest abuse rates (26%) compared with whites (11%), Latinos (10 %), and African Americans (9%). Only 6% of Asian American adolescents used these substances (National Institute on Drug Abuse, 2006).

Table 15-6 lists some factors that, in general, influence children's use of drugs. One of the best predictors of smoking is whether the child's best friend smokes (Gritz, 2004). In addition, children who are undercontrolled, impulsive, risk taking, moody, and who overreact to minor frustrations are more likely to become frequent drug users (Epstein et al., 2001). Heavy drug use by parents and peers is related to children's use of alcohol and marijuana (Smith, 2001; Willis & Yaeger, 2003). Also related to marijuana use are poor academic records, truancy, minor delinquency, and the desire to experiment. Finally, the more peers in the school who use tobacco and alcohol, the more opportunities there are for other children to begin to use these substances and the more they do so (Cleveland & Wiebe, 2003). If a youth uses marijuana to resolve psychological problems rather than as a response to social situations, he or she is likely to go on to use hard drugs (Gelfand & Drew, 2003). Those who start their drug careers early (before age 15) are at the highest risk for developing a serious drug problem and for continuing to use drugs into adulthood (Hawkins et al., 1997). A close relationship with a responsible, stable family that strongly disapproves of their use of drugs helps to buffer adolescents against drug abuse (National Institute on Drug Abuse, 2006).

TREATING CONDUCT DISORDERS   The most successful approaches to treatment for conduct disorders have employed social learning and behavioral

Table 15-6   Some characteristics of young users and nonusers of drugs

	Users	Nonusers
Cultural Influences		
Attitudes toward drug use	Acceptance	Low acceptance
Drug use in society	High exposure	Low exposure
Contextual and Neighborhood Influences		
Crime	High crime	Low crime
Employment	Unemployment	Low unemployment
Schools	Inadequate schools	Adequate schools
Availability of drugs	Readily available drugs	Drugs are not readily available
Educational and career opportunities	Lack of legitimate opportunities	Legitimate opportunities available
Family Influences		
Drug use	Parents are users (especially mothers)	Parents do not use drugs
Religion	Not religious	Religious faith
Values	Nontraditional values	Traditional values
Family conflict	More family conflict	Less family conflict
Siblings	Siblings are users	Siblings do not use drugs
Peer Influences		
Drug use	Best friend is user	Best friend does not use drugs
Peer power	Peers are more influential	Peers are less influential
Individual Factors		
Opportunity	Opportunity to take drugs	No opportunity to take drugs
History	Good experiences with drugs	Unpleasant drug experiences
Adjustment	Possible adjustment problems	Possible superior adjustment
Attitude toward authority	More rebellious and questioning	More conforming
Attitude toward deviance	More tolerant of deviance	Less tolerant of deviance
Deviance	More deviant behavior	More conforming behavior
Attitude toward school achievement	Less concerned about school achievement	More concerned about school achievement
Self-esteem	Low self-esteem and low self-efficacy	High self-esteem and self-efficacy
Mood	Depressed mood	Not depressed
Coping skills	Poor coping skills	Adequate coping skills
Biological susceptibility to drug addiction	Higher biological susceptibility to drug addiction	Low biological susceptibility to drug addiction

Sources: Based on Gelfand & Drew, 2003; Gelfand et al., 1997; Petraitis, Flay, & Miller, 1995.

time-out Removing children from a situation or context in which they are acting inappropriately until they are able and ready to act appropriately.

techniques (Reid et al., 2002). Parents can be trained to teach and reinforce appropriate behavior and to use nonreinforcement and **time-out**—removing children from a situation or context in which they are acting inappropriately until they are able and ready to act in an appropriate manner—to suppress undesirable behaviors. These approaches have been found to reduce rates of conduct disorders among aggressive, delinquent boys (Cavell et al., 2007; Patterson, 2002) as well as to reduce disruptive behavior in classrooms (Walker, 1995). A variety of prevention programs involving parent training, home visits, social skill training, academic tutoring, and classroom intervention have produced promising results (Conduct Problems Prevention Research Group, 2006;

	Before	After
Drug Use		
Weekly marijuana use	80.4%	43.8%
Heavy drinking	33.8%	20.3%
Hallucinogen use	31.0%	26.8%
Stimulant use	19.1%	15.3%
School Performance		
Regular attendance	62.6%	74.0%
Grades (average or better)	53.4%	79.6%
Criminal Activities		
Any illegal act	75.6%	52.8%
Any arrest	50.3%	33.9%

Table 15-7

Behavior of adolescents before and 1 year after treatment

Sources: Grella, 2006; Hser, Grella, Hubbard, et al., 2001.

Kress & Elias, 2006; Patrikakou et al., 2005; Weissberg & Greenberg, 1998a, b) (see also Aggression Prevention: A Multipronged Effort in Chapter 14). As Box 15-2 demonstrates, an ecological, multisystem intervention method can be effective in treating serious juvenile offenders.

Despite the great concern over youth substance abuse, our social policies and intervention programs have not dealt effectively with this problem. Even the best-run programs—which typically involve detoxification, total abstinence from a drug, and intensive educational and counseling efforts over a period of weeks or months—have recidivism rates that can range as high as 70% (Newcomb & Bentler, 1989). In the case of tobacco use, for example, Shiffman (1993) estimated that one treatment program produced abstinence from smoking for 1 year in about 38% of the young people in the program; thus, 60% to 70% of those in treatment had relapsed by the end of that year. However, more recent intervention programs are beginning to report better and more lasting results in reducing drug abuse among adolescents (Liddle & Rowe, 2006). As Table 15-7 shows, drug abuse treatment involving either inpatient residential or outpatient programs can be effective for reducing drug use and criminal activity and improving school performance for adolescents (Grella, 2006; Hser et al., 2001). Moreover, prevention efforts to reduce substance use in preadolescence can be successful in stemming the onset and level of substance use (Spoth et al., 2003). Evaluation of a family-based prevention program aimed at reducing use of alcohol and tobacco among sixth to tenth graders suggests that the incidence of this sort of problem can be reduced (Guyll et al., 2004; Spoth et al., 2001). The investigators taught families in the program a variety of skills, including the following:

1. Increased prosocial involvement in the family
2. Improved parenting and child-management practices
3. Increased ability of children to resist peer pressure
4. Reduced family conflict
5. More frequent expression of positive emotion among family members

Compared with children of families in the control group, which was not offered treatment, children in the treatment group were slower to begin using alcohol and tobacco and, at the end of a 4-year period, exhibited less overall substance use.

Attention Deficit/Hyperactivity Disorder

Some authorities question whether conduct disorders differ from the disorder called attention deficit/hyperactivity disorder. The essential feature of **attention deficit/**

attention deficit/hyperactivity disorder (ADHD) A childhood disorder characterized by a persistent pattern of inattention and hyperactivity or impulsivity that far exceeds such behaviors observed in children at comparable levels of development.

BOX 15-2

Child Psychology in Action

TREATING SERIOUS MULTIPROBLEM JUVENILE OFFENDERS

Adolescents, especially males, have higher crime rates in most categories than any other age group (Dodge et al., 2006), and they are one of the most difficult groups to treat successfully. Recidivism rates among serious juvenile offenders, even those who receive treatment, are often more than 70%. This is true in part because these delinquent adolescents have multiple problems and in part because most treatment methods tend to be either too narrow, focusing on only one or two characteristics of youth's ecology, or too broad, placing juveniles in institutions or foster homes.

Serious antisocial behavior is related to personal problems and difficulties functioning in the family, peer group, school, and community. Henggeler et al. (1992, 2007) used Bronfenbrenner's ecological model of development (Chapter 1) to develop a multisystem therapy (MST) to treat serious juvenile offenders and their multiproblem families. MST attempts to change systems and processes—such as parental discipline, familial emotional reactions, peer associations, and school performance, which research has identified as related to adolescent antisocial behavior. Thus, in addition to the focus on altering family relations, MST attempts to modify dysfunctional interactions in various settings such as the home or school. MST also tries to be sensitive to individual and sociocultural differences in juvenile offenders (Henggeler et al., 2007).

Henggeler and his associates (1992) randomly assigned 96 juvenile offenders to either an MST treatment group or a typical treatment involving social agencies, curfew, enforced school attendance, and monitoring by a probation officer. Although the adolescents were on average only 15 years of age, they were serious offenders. They had averaged more than three previous arrests and 8 weeks of prior incarceration, and 59% had had at least one arrest for a violent crime.

The researchers used a battery of measures to assess levels of criminal activity and duration of incarceration; improvements in family relations, peer relations, and social competence; and decreases in psychopathology in both youth and their parents. The MST treatment involved 33 hours of direct contact with a therapist over an average of 13 weeks. At the time of the posttreatment assessment, 59 weeks after the participants' first referral, the recidivism rate for the MST group was 42%, compared with 62% for the group who received the typical treatment. In addition, 68% of the typical treatment group had been incarcerated after the study ended, whereas only 20% of the MST youth spent time in jail between the study and the posttreatment evaluation. On average, the MST youth were incarcerated for 73 fewer days than the typical treatment group. Important factors associated with the MST group's decrease in criminal activity and jail time included increased family cohesiveness as well as less aggressive and more positive relationships with peers. Recently, the researchers have found that this approach is useful in treating not just delinquency but a wide range of problems, including adherence to medical regimens and alcohol and drug abuse as well (Henggeler et al., 2007).

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hyperactivity disorder (ADHD) is a persistent pattern of inattention and hyperactivity or impulsivity that is far in excess of such behaviors observed in children at comparable levels of development (American Psychiatric Association, 2000) (see also Table 15-8 for the *DSM* criteria for the diagnosis of ADHD). ADHD—another problem of undercontrol—leads to difficulties in the home, the classroom, and the peer group (American Psychiatric Association, 2000; Barkley, 2000). A variety of studies have demonstrated that hyperactive children not only run into conflict with adults in their environment but also perform more poorly than other children in school, present serious classroom-management problems to the teacher, have difficult peer relations, and often think of themselves as being "no good" (S. B. Campbell, 2000). Perhaps even more important, in at least 60% of these children, some of these problems persist into adolescence and early adulthood (Weiss et al., 1999). Attention deficit disorders occur more frequently and are more sustained in boys than in girls (American Psychiatric Association, 2000).

Criterion	Description
Criterion A	The essential feature of attention-deficit/hyperactivity disorder is a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequent and severe than is typically observed in individuals at a comparable level of development.
Criterion B	Some hyperactive-impulsive or inattentive symptoms that cause impairment must have been present before age 7 years, although many individuals are diagnosed after the symptoms have been present for a number of years.
Criterion C	Some impairment from the symptoms must be present in at least two settings (e.g., at home and at school or work).
Criterion D	There must be clear evidence of interference with developmentally appropriate social, academic, or occupational functioning.
Criterion E	The disturbance does not occur exclusively during the course of a pervasive developmental disorder, schizophrenia, or other psychotic disorder and is not better accounted for by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, or personality disorder).

Table 15-8

DSM-IV-TR definition of ADHD

Source: Reprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Copyright 2000. American Psychiatric Association.

CHARACTERISTICS OF THE DISORDER   Victor exemplifies children with this disorder, who display overactivity, poorly sustained attention, impulsivity, and problems with adherence to instructions and rules (Barkley, 2000; Reiff & Tippins, 2004). Probably the most marked symptom that parents and teachers notice about hyperactive children is their inappropriately high activity level. In free-play situations, hyperactive children are no more active than other children. But in structured situations like the classroom, which demand controlled, task-oriented behavior, their activity is conspicuous (Barkley, 1998). They fidget, tap their feet, poke their neighbors, and talk out of turn. A child who is engaged in the same amount of motor activity but who is diligently working is judged by the teacher to be normally active (Gelfand & Drew, 2003). The hyperactive child's behavior disturbs peers and disrupts the class, which may help account for the fact that 50% to 60% of children with ADHD are rejected by their peers (Henker & Whalen, 1999).

The hyperactive child's inappropriate activity appears to diminish during adolescence; unfortunately, other problems persist (Weiss et al., 1999). One of the most persistent problems is *inattention,* which becomes especially problematic in school, where teachers may have to expend considerable effort to keep these children focused on a task (S. B. Campbell, 2000).

Another persistent problem experienced by some hyperactive children is *impulsivity.* Hyperactive children often seem to act before they think. Impulsivity can be seen in the frequent accidents of the preschooler and the poorly thought-out test answers of the school-age child. It may continue into adult life, where more frequent changes in residence and a higher incidence of automobile accidents are found among formerly hyperactive children (American Psychiatric Association, 2000; S. B. Campbell, 2000).

Children with attention deficit/hyperactivity disorder also find it difficult to follow rules such as, "When your little brother takes one of your toys, don't hit him, or you will be sent to your room," because they have problems *tracking* contingencies (Barkley, 1998). As a result of all these problems, it is not surprising that hyperactive children tend

A prime characteristic of hyperactive children is their inability to attend for long or to stay with a specific activity or task, particularly one that requires them to sit quietly and concentrate.

to do poorly in school. They typically function 1 to 2 years below grade level despite normal IQs (Barkley, 1998; Pisecco et al., 2001).

CAUSAL FACTORS IN ADHD   What is the cause of this frustrating collection of problems, and how can we help hyperactive children? Research on this topic has been complicated because so many explanations for the etiology and treatment of hyperactivity have been offered. Of the more credible explanations of hyperactivity, one suggests that the problem has a biological origin and the other implicates the environment.

Biological Factors   For years, the leading biological explanation of hyperactivity suggested that this particular cluster of problems was caused by some form of *minimal brain dysfunction*. Supporting this explanation, computer-imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) scans have revealed brain abnormalities in several areas (Casey, 2001). Another biological effect is evident in the effect of **psychostimulant medications**—drugs such as caffeine, amphetamine, or methylphenidate (one brand name is Ritalin) (Whalen, 2001). These medications increase attention and, as a result, reduce extraneous activity, enabling the child to focus on a task and complete it. Today, psychostimulants are a common treatment for children with ADHD, some of whom refer to these medications as their "arithmetic pills" (Gelfand & Drew, 2003). At present, the most popular biological hypothesis is that ADHD is a genetic disorder. Evidence suggests that activity level is more similar between normal monozygotic twins than between dizygotic twins (Plomin, 1990b).

Psychological Factors   As an alternative to biological explanations of ADHD, some researchers have suggested that hyperactivity is environmentally caused. Diverse social and familial stressors such as poverty, low levels of education, marital discord and disruption, household disorganization, and inept parenting have all been associated with ADHD (S. B. Campbell, 2000). Research focused on parent-child relations has found that the mothers of hyperactive children generally are more controlling and intrusive and less affectionate and reinforcing than the mothers of normal children. However, most investigators think that excessive parental control and lessened affectional response are likely reactions to hyperactivity rather than its cause (Barkley, 2000). However, although a mother's intrusive, nonreinforcing behavior may initially be a reaction to a hyperactive child, in time, her reaction may exacerbate the child's problems. Hyperactivity appears to be a disorder with multiple causes. Brain damage may cause hyperactivity in some instances, and inheritance, environmental lead poisoning, or dietary agents may explain other cases. It also seems likely that some children's hyperactivity is exacerbated by the specific environments in which they are reared.

TREATING HYPERACTIVITY   At this point, there is little doubt that psychostimulant medication (e.g., Ritalin) improves the behavior of about 80% of all hyperactive children, at least in the short term (Cunningham, 1999; Mehta et al., 2001). Improvement is quite rapid and noticeable to parents and teachers, who quickly become advocates of the medication approach. The impact of psychostimulants is so dramatic that it is estimated that between 1% and 2% of American schoolchildren are currently taking the drugs. However, many observers object to the use of these medications, citing concerns that range from the philosophical stance that altering children's behavior with drugs is inappropriate to questions about the side effects of psychostimulants, which include suppression in the rate of physical growth, irritability, insomnia, weight loss, and abdominal pain (Barkley, 2000; Gelfand & Drew, 2003).

The major alternative treatment available for hyperactivity is **behavior therapy**, a psychological intervention based on social learning principles, primarily reinforcement. In traditional behavior therapy programs, parents and teachers are taught to identify and monitor various specific, troublesome aspects of the hyperactive child's behavior (e.g., not completing class assignments on time) and to systematically reward the child for

psychostimulant medications Drugs, such as amphetamines and caffeine, that increase alertness and attention as well as psychomotor activity.

behavior therapy A psychological form of treatment, often used in treating conduct disorders, that is based on such learning principles as reinforcement and social learning.

making improvements in the targeted problem area (Hardman et al., 2002). In related behavior therapy programs, teachers and parents also work directly with the child in an attempt to teach cognitive self-control strategies.

To address the ongoing controversy of whether drugs, psychosocial intervention, or both are the best way to treat children with ADHD, the National Institute of Mental Health launched a large clinical trial (Jensen et al., 2001; Wells, 2001). Nearly 600 children ages 7 to 9 with a primary diagnosis of ADHD were randomly assigned to one of four treatment conditions. One group received only medication; a second group received only psychosocial treatment consisting of parent training, teacher consultation, and cognitive-behavioral and behavioral treatments aimed at fostering academic, social, and sports skills. Children in the third group received a combination of both medication and psychosocial treatment, while those in the fourth group received only routine treatment from their community pediatrician or the school. Results indicated that children in all four treatment groups improved after the 14 months of treatment and 10 months of follow-up. Not only did ADHD symptoms decrease, but symptoms of oppositional defiant disorder and internalizing symptoms decreased as well. Moreover, social skills, academic achievement, and parent-child relationships improved. But not all treatments were equally effective. Children receiving medication or the combined treatment (medication and psychosocial intervention) showed greater improvement than those receiving psychosocial treatment alone or community treatment, especially in ADHD symptoms. Moreover, children in the combined group showed the most impressive improvement on other measures, such as oppositional symptoms, internalizing symptoms, social skills, and reading achievement.

Depression in Childhood

Depression in childhood—an overcontrolled disorder—is diagnosed when a child has seemed depressed or has lost interest or pleasure in nearly all activities for at least 2 weeks. The dominant mood may be one of irritability and crankiness rather than sadness and dejection. Family members often notice social withdrawal or neglect of activities the child formerly enjoyed; for example, a child who used to enjoy playing soccer may begin to make excuses not to practice. Emily was suffering from many of these symptoms. Depression often interferes with appetite and eating, and parents may note a failure of the child to make normal or expected weight gains. Another common effect of depression is an impaired ability to think, to concentrate, or to focus on a task; a precipitous drop in grades may signal depressive problems in a child or adolescent. Somatic complaints (e.g., headache, stomachache) are not uncommon in children with depression. Table 15-9 lists some behaviors that are common in children and adolescents with depression.

To be judged clinically depressed, a child must display changes in cognitive functioning and behavior. Possible changes in cognitive functioning include guilt and feelings of worthlessness, complaints about inability to concentrate, slowed thinking, and recurrent thoughts of death and suicide. Depression in childhood is low in frequency (1.7%), in part because of the difficulty of reliably diagnosing it (Gelfand & Drew, 2003). The fact that professionals diagnose depression in children more frequently as children grow older probably reflects both that difficulty and the fact that depressive disorder is experienced at its fullest only when the child's cognitive capacities reach the stage of formal operations. As Figure 15-4 shows, depression is rarely diagnosed among children under the age of 10, but the diagnosis rises in frequency quite dramatically among adolescent females from the age of 15 and continues to rise into adulthood. The diagnosis rises for males as well at about 15 but levels off at about 18. Nearly twice as many girls as boys experience depression (Goodman & Gotlib, 2002; Hammen, 2005).

One unfortunate consequence of the increased rate of depression during adolescence is a concomitant increase in the rate of suicide. Although suicide is very rare among

depression in childhood Like adult depression, a mood disorder often manifested in a depressed mood and loss of interest in familiar activities but also likely to be expressed as irritability and crankiness. Difficulty concentrating or focusing on tasks and concomitant drops in school grades are not uncommon, and children with depression often complain of physical problems such as headache.

	Behaviors
Infants	Sadness, crying, apathy, motor retardation, failure to thrive, vomiting, irritability, developmental delays, feeding or sleeping difficulties
Toddlers and Preschoolers	Irritability, social withdrawal, negative self-image, peer problems, anxiety, phobias, weeping, loss of interest or pleasure in usual activities, loss of appetite, sleep disturbances, changed activity rates, failure to thrive, aggression, self-endangering behaviors, somatic disorders including urinary and fecal incontinence, asthma, eczema, desire to die
Schoolchildren	Irritability, loss of interest or pleasure in usual activities, fatigue, somatic complaints, sleeping and eating disturbances, changed activity rates, guilt, low self-esteem, sudden schoolwork problems, aggression, decreased ability to concentrate, phobias, anxiety, separation anxiety problems, depressed facial expression, suicidal thoughts
Adolescents	Disturbed sleep, appetite or weight changes, changed activity rates, fatigue, loss of interest or pleasure in usual activities, self-devaluation, difficulty in concentrating, indecisiveness, anxiety, phobias, somatic disorders, excessive emotional dependence, withdrawal, reckless behavior, suicidal thoughts or attempts

children younger than 12, it is estimated to be the third leading killer of adolescents, following car accidents and homicide (Berman et al., 2005; Centers for Disease Control and Prevention, 2007). Among college students, it is the second leading cause of death; about 10,000 individuals attempt suicide, and of those, 1,000 succeed each year. About 3% of older adolescent girls and 1% of boys make at least one serious suicide attempt (Centers for Disease Control and Prevention, 2002). About 17% of high school students seriously considered suicide; 13% made specific suicide plans (Centers for Disease Control and Prevention, 2007). Females are much more likely to attempt but to fail at suicide than are males. One reason is that females more often use such methods as overdosing with drugs or poisons or suffocation, whereas males tend to use methods that have faster and surer results, such as shooting or explosives.

Culture plays a role in suicide as well as age and gender. Suicide rates are high in countries such as Japan, where there is a long history of viewing suicide as an honor-

Figure 15-4

Clinical depression among children and adolescents

Clinical, or serious, depression is not seen often among children, but beginning at about the age of 15, it is diagnosed in a considerable number of young people. About twice as many females as males are found to be seriously depressed, and depression continues to rise slowly as young women enter adulthood.

Source: Hankin et al., 1998.
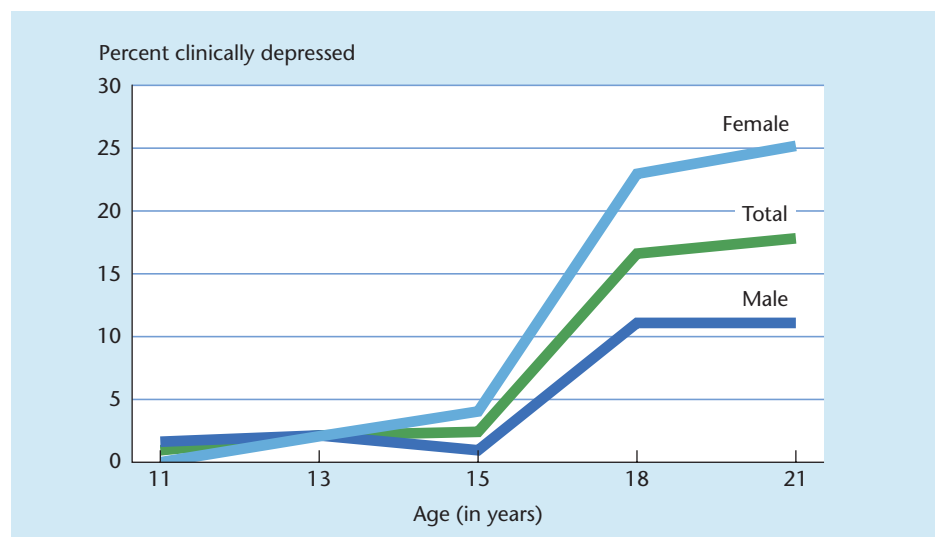
able tradition. In Muslim and Catholic countries, where suicide is viewed as a violation of religious teachings, rates are low. In North America, American Indian youth have high rates of suicide; one recent study found the rate to be five times higher than that for youth in the general population (Chandler et al., 2003). Many factors, including poverty, loss of their traditional culture, limited educational and job opportunities, and alcohol and drug use, contribute to these elevated rates. Among inner-city African American and Latino American gangs, suicide rates are rising as well (Rotherman-Borus et al., 2000). Although depression and suicide are often linked, this is not always the case (Jellinek & Snyder, 1998). In one large study of adolescents, 42% of those who attempted suicide did *not* have a history of depression (Andrews & Lewinsohn, 1992). Suicide is related to a general sense of overwhelming hopelessness, although it also may result from the accumulation of adverse life events such as family conflicts; loss of a family member due to illness, death, or divorce; breakups or problems in romantic relationships or friendships; school failure; being apprehended in a delinquent, forbidden, or embarrassing act or situation; or real or imagined mental or physical illness (Jellinek & Snyder, 1998). Adolescents who attempt suicide often feel they have no source of emotional support. They frequently are alienated from their families and may have had disruptions or losses in intimate relations and relations with peers that give them an increasing sense of isolation and helplessness.

A mother's depression and listlessness may lead the child to become depressed later on. Disruption in early attachment, as well as modeling, may contribute to the link between parent and child depression.

CAUSES OF CHILDHOOD DEPRESSION   Theories of the etiology of depression are abundant. Like many human disorders, depression is very likely caused by multiple factors. Thus, in discussing biological, social and psychological, and cognitive theories, we will be looking not for one answer but for many, and we will be seeking to learn how such contributing factors interact.

Biological Theories   Biological theories of the cause of depression have focused more on adults than on children. Although a causal role has not been demonstrated, evidence has linked depression among adults with low levels of chemicals that facilitate the transmission of neural impulses (Jacobs, 2004). Similar biochemical evidence has not been consistently obtained in children with depression (Wicks-Nelson & Israel, 2000). However, by age 3, children of parents with chronic depression showed lower activation in a variety of brain regions than children of nondepressed mothers (Embry & Dawson, 2002). Infants of mothers who were depressed, but whose depression improved, showed normal brain activity at 3 years of age. This suggests that environmental factors play a role in early depression and in early brain development as well. It seems likely that environmental factors play a considerable role in childhood depression (Cummings et al., 2000). The relative contributions of family interaction and genetic influences remain an open question (Gotlib et al, 2006; Sheeber et al., 2002; Silberg et al., 2001).

Social and Psychological Theories   One of the earliest theories of the causes of childhood depression linked it to the loss of maternal affection or failure to form a secure attachment (Bowlby, 1960). Although some research has supported this position, other factors, such as parental conflict, maternal depression, negative life events, lack of effective social supports, and especially for girls, problems with peers and unpopularity, have been linked with depression in children (Cummings et al., 2000; Hammen, 2005).

The link between depression in parents and children has received considerable attention in the research literature. Depression is more likely to occur in children of parents with clinical depression (Cicchetti & Toth, 2006; Goodman & Gotlib, 2002). Indeed, children of parents with depression are at risk for higher rates not only of depression but also of a wide range of other disorders such as anxiety, academic failure, attention deficit disorders, and conduct disorders, especially if the parent's depression is chronic or

BOX 15-3

Risk and Resilience

DOES A CULTURE OF AFFLUENCE PROTECT CHILDREN AND YOUTH FROM THE RISK OF PSYCHOPATHOLOGY?

In many Western cultures, such as that of the United States and Canada, affluence and the acquisition of material goods are revered. But does wealth buy happiness and protect children from developing psychological problems?

> According to surveys, in spite of historical trends that show that Americans have far more luxuries than they had in the 1950s, with twice as many cars per person and microwave ovens, VCRs, air conditioners, and color TVs, they are no more satisfied with their lives. (Diener, 2000, p.11; cited by Luthar, 2003)

The divorce rate has doubled. Teen suicide has tripled. Depression rates have soared. This conjunction of material prosperity and social recession has been called *the American Paradox* (Myers, 2000).

But what about children? Are they not better off growing up in the relative affluence of suburban life compared with children and adolescents who grow up in poverty in the inner cities? Are suburban youth not happier and less likely to suffer from psychological problems such as depression, delinquency, and substance abuse? A study of nearly 1,000 American teenagers revealed a negative relation between parents' socioeconomic status and adolescents' happiness

(Csikszentmihalyi & Schneider, 2000). Rich youth are not only less happy, but they may also be at risk for a variety of mental health problems. It is not just the poor, the disadvantaged, and members of minority cultures who are at risk for psychopathology; privileged children from wealthy homes are also at risk for alcohol and illegal drug abuse.

Suniya Luthar (Luthar, 2003, 2006a; Luthar & Latendresse, 2005) has directed her attention to the high cost of affluence for American youth. In a sample of tenth-grade students in an affluent suburban community, she found that suburban youth reported significantly higher levels of anxiety symptoms and of cigarette, alcohol, marijuana, and hard drug use than did their economically disadvantaged, inner-city peers. Compared with national samples, more than one in five suburban girls (22%) reported clinically significant depressive symptoms—rates three times as high as those in normative samples (7%). Rates of clinically significant anxiety among boys (22%) and girls (26%) were higher than national average rates for boys (17%) and girls (21%). Similarly, when compared with national samples, affluent young people displayed a higher frequency of substance abuse, particularly of alcohol among girls (72% during the past year ver-

sustained (Embry & Dawson, 2002; Hammen, 2005; Weissman et al., 1997). Although twin and adoption studies indicate that this association between depression in children and parents may in part be genetic, other studies show that the experiences of children with a depressed mother may differ from those with a nondepressed mother. Mothers with depression are tenser, more disorganized, resentful, and ambivalent, and less sensitive, communicative, and affectionate with their children (Cummings et al., 2000; NICHD Early Child Care Research Network, 1999). Furthermore, they are more likely to perceive their children's behavior negatively (Hammen, 2005). It is not surprising, then, that children of mothers with depression are more likely to be insecurely attached, fearful, and lower in self-esteem and to have problems in subsequent social relations (Cicchetti & Toth, 2006; Lyons-Ruth et al., 2002).

It is not just mothers who contribute to children's depression. Jacob and Johnson (1997) found that both paternal and maternal depression were associated with child depression. As family systems theory would predict, when one parent is depressed, the marital relationship suffers, and this, in turn, leads to inadequate parenting. Peers can play a role in children's mental health, too. Elementary schoolchildren who were socially anxious (shy, inhibited) and who were excluded by their peers were at higher risk for depression than nonanxious and better accepted classmates (Gazelle & Ladd, 2003). Life stressors also contribute to depression (Hammen, 2005). Finally, cultural expectations emphasizing achievement, success, and wealth may contribute to the

sus 61% in normative samples), and of illicit drug use among affluent boys (rates of 59% versus 38%).

Moreover, the reasons for substance use differed for rich and poor adolescents. For affluent teens, substance use and maladjustment (anxiety, depression) were related, whereas there were no links between adjustment and drug use among poor adolescents. Affluent adolescents appear to use drugs as a way of "self-medicating" to relieve their anxiety and depression. This is particularly troubling because adolescents who use drugs as mood regulators are more likely to continue to be regular users in later adolescence and adulthood (Zucker et al., 1995). Moreover, peer groups in affluent, suburban settings were more likely than inner-city peer groups to endorse substance use among boys. Peer popularity was linked with high substance use among boys of higher socioeconomic status, but among inner-city boys, it was not linked.

There are several reasons for these patterns. First, affluent youth are under high pressure to achieve, and that pressure takes its toll on their adjustment. Adolescents who were rated high in perfectionist strivings had elevated distress and delinquency scores that, in turn, were linked with substance use. Second, adolescents' lack of closeness to their mothers was linked to distress, delinquency, and substance abuse for both boys and girls. Third, minimal after-school supervision was related to girls' distress, delinquency, and substance abuse. In sum, the combination of excessively high expectations and isolation from adults in wealthy families puts affluent youth at risk for drug and alcohol problems. Clearly, being rich is not a protective factor, and it may be a risk factor for these forms of developmental ills.

Are there factors that protect children from the parental and peer pressures that affluent children may encounter? There are three types of factors that can do this: positive abilities in the child (high intelligence, high self-esteem), a supportive family environment (even one warm and supportive parent), and helpful individuals outside the family (in schools, peer groups, or churches) (Luthar, 2006b; Werner, 1995). The effect of these protective factors is not automatic, however. Protection does not lie in the availability of supportive resources but in the child's use of them. Thus, children's own strengths make an extremely important contribution to the resilience they show in the face of risk and to whether they develop as healthy children or are plagued by psychological problems.

emergence of depression if children fail to meet these expectations. Box 15-3 discusses this and other problems facing even affluent youth in American society.

Cognitive Theories   An alternative theoretical explanation of depression invokes the concept of **learned helplessness**, a kind of behavior that results from the belief that one is helpless to control the events in one's world (Seligman, 1974). The learned helplessness theory of depression proposes that people with depression not only experience feelings of helplessness but attribute their failures in controlling the world to enduring personal shortcomings. Essentially, this cognitive theory asserts that people become depressed when they perceive themselves as having failed to achieve desired outcomes in their lives (Garber & Martin, 2002).

learned helplessness A kind of behavior that results from the belief that one is helpless to control the events in one's world.

TREATING CHILDHOOD DEPRESSION   Children and adolescents with depressive disorders benefit from a wide range of interventions. Antidepressant drugs such as fluoxetine (Prozac) and sertraline (Zoloft) are widely prescribed and somewhat effective. In one study, 56% of children with major depression improved with Prozac compared with only 33% of a placebo control group (Emslie et al., 1997). Unfortunately, antidepressant drugs are dangerous, and an overdose can be lethal (Gelfand & Drew, 2003). In 2004, the U.S. government began to require that warning labels accompany these antidepressant drugs in light of the increased risk of suicide associated with their

use in a small percentage of adolescents. However, the rates of suicide showed a sharp increase at the same time that the use of antidepressants among adolescents declined, which suggests that parents need to be aware of warning signs of suicide whether their teens are on antidepressant drugs or not (Center for Disease Control and Prevention, 2007).

cognitive behavior therapy is one of the most effective approaches for treating depression in adolescents (Hammen, 2005). This type of therapy is typically conducted in small groups of three to eight adolescents twice a week over a number of weeks. The goals are to reduce the teenagers' self-consciousness and feelings of being different and to provide them with strategies such as relaxation techniques and self-control strategies to help them control their dark moods. The therapy also emphasizes positive strategies such as improving peer relations, setting realistic goals, and learning how to get more fun out of activities. Results have been impressive. In one series of studies, between 54% and 67% of treated adolescents no longer met the *DSM* criteria for depression (Clarke et al., 1992; Lewinsohn & Rhode, 1993). Among teenagers with similar depressive problems who were on a waiting list for therapy and served as controls, only 5% to 48% no longer met the criteria. Unfortunately, nearly one third of adolescents treated with cognitive behavior therapy experienced recurrence within 2 years (Birmaher et al., 2000).

Prevention programs have been effective in reducing depression, too. In one study, children at risk for depression were given training in cognitive and problem-solving skills (Gillham et al., 1995). Two years later, when researchers evaluated these children, they found fewer depressive symptoms than in a control group.

Autism Spectrum Disorders

Autism has the following puzzling and disturbing characteristics:

Extreme autistic aloneness, expressed as a lack of interest in other people that sometimes appears to be an actual aversion to contact with other human beings.

Language abnormalities, ranging from nonspeech to repeating others' exact words rather than replying or engaging in conversation.

Attempts to preserve sameness in the environment that may lead to repetitive behaviors or total and extended concentration on something like a spinning top.

Pauli displayed many of these behaviors.

Asperger's disorder shares some of the social and affective deficits associated with autism. However, children with Asperger's do not show significant language delays and are often able to progress in school at a satisfactory rate (Pennington, 2005; Volkmar et al., 2004). Currently, autism and Asperger's syndrome are viewed as part of a broader diagnostic category of *Autism Spectrum Disorders (ASD).*

How prevalent are these disorders? Although a decade ago estimates ranged from 4 to 5 per 10,000 individuals (American Psychiatric Association, 2000; Patterson & Rafferty, 2001), rates of ASD have increased, owing not only to better detection but also to the use of broader diagnostic criteria that increase the number of children being labeled as part of the autistic spectrum (Baron-Cohen, 2007). Current estimated rates of ASD range between 3 and 7 for every 1,000 children between ages 3 to 10, which suggests that this is a more common disorder than was previously thought (Centers for Disease Control, 2007; National Institute of Mental Health, 2007). These disorders are more common in boys than in girls; the ratio is three to five boys to one girl (American Psychiatric Association, 2000).

It is difficult to imagine just how disturbed a child with autism is, but once you have observed one of these unfortunate children, the memory will last forever. If two children with autism are placed side by side in a room full of toys, chances are that they will

cognitive behavior therapy A group therapy technique particularly useful in treating depression in adolescents. Therapeutic goals include reducing self-consciousness and feelings of being different and teaching strategies for dealing with depressive moods and for acquiring a more positive outlook and improving social interactions.

autistic disorder A disorder in which children's ability to communicate and interact socially is seriously impaired; children with autism have specific language deficiencies, demonstrate a need for sameness in their environment, and often engage in repetitive and stereotyped kinds of behaviors.

Children with autism often fail to develop a useful means of communication with others, whether verbal or nonverbal. Such children may be highly resistant to change and to new patterns of behavior. At the same time, because these children often seem to prefer inanimate objects to human interaction, psychologists are exploring the approach of teaching children with autism to communicate by means of a computer.

ignore each other. They seem to prefer inanimate objects to human interaction. Children with autism often avoid eye contact with others and fail to modulate social interaction in any way. Often, they appear to be unaware of other people and even of themselves. Some children with autism seem not to recognize themselves as independent social beings (Dawson et al., 1998). Children normally develop the ability to recognize their mirror images as themselves around the age of 2. Children with autism show deficits in self-recognition. When researchers in one study showed children with autism a mirror, 31% failed to demonstrate recognition of their mirror images (Spiker & Ricks, 1984). These children also were likely to lack speech. However, even the children who showed self-recognition demonstrated little emotional response—unlike normal children.

Researchers using subtle measures of attention, such as heart rate, have shown that children with autism are aware of the presence of other people (Baron-Cohen, 1995). However, they may not reflect this knowledge in their overt behavior. Many children with autism manifest a lack of attachment and empathy in social relations. They also seem unable to understand that mental states such as knowledge, beliefs, and expectations exist and are connected to people's behavior (Baron-Cohen, 1995, 2003; Siegler & Alibali, 2005). This lack of a theory of mind makes it difficult for children with autism to anticipate and predict others' responses and thus makes it hard for them to engage in effective social interactions. Most children with autism fail to develop normal friendships and become social isolates (American Psychiatric Association, 2000; Baron-Cohen, 2003).

Children with autism display deficits in both nonverbal and verbal communication. They have difficulty understanding facial expressions of emotion and integrating or using gestures such as those meaning "be quiet" or "come here" or "look" (Baron-Cohen, 2003, 2007). They are less likely than normal children to respond when called by name or to respond to an adult's point and gaze (Dawson et al., 2004). They display less attention to the distress of another person. In addition, some 50% of children with autism never develop meaningful, useful speech, and most others have limited and sometimes bizarre means of verbal expression.

Many children with autism master only a few of the tasks necessary to function in the world and need constant help with feeding, dressing, toileting, and cleaning. Although their senses function adequately when tested, children with autism behave as if they have sensory deficits. For example, they spend their time engaging in **obsessive self-stimulatory behavior** such as repetitively spinning objects, switching lights on and off, or flapping their hands in front of their eyes (Pennington, 2005). It is thought

obsessive self-stimulatory behavior Behavior common in children with autism in which they engage in repetitive actions that seemingly have no purpose.

that the primary purpose of this bizarre-appearing behavior may be to provide sensory stimulation.

Some children with autism show a type of intelligence traditionally associated with the *savant*. This is a person who has some unusual talent—particularly in the area of mathematical and computer abilities—such as being able to quickly and accurately predict the day of the week on which some date far in the future will fall. Some children with autism show remarkable memory, such as the ability to repeat television commercials verbatim. However, about 70% of children with autism score in the retarded range on commonly used measures of intelligence, and this below-average performance is quite stable over time (Kauffman, 2001).

CAUSES OF AUTISM   At present, the cause of autism is unknown. Some investigators once suggested that the cause might be of psychological origin and attributed the disorder to parents who were cold and aloof. Scientists who held this view described parents of children with autism as "refrigerator parents" who thawed out just long enough to conceive a child. Such assertions were unfounded and have created unnecessary guilt and anxiety among the parents of children with autism. If these parents seem somewhat distant from their children, it is much more likely to be a reaction to their child's social aversion than a cause of the child's disorder. Furthermore, the onset of the disorder comes so early in life that it hardly seems likely that a disorder as severe as autism could be caused by parents' "unconscious rejection" of their child.

Currently, it is almost universally accepted that autism has a biological cause yet to be specified. Twin studies have implicated genetics, finding a higher incidence of the disorder in monozygotic than in dizygotic twins (Nigg & Goldsmith, 1994; Rutter, 2007). In one study, the concordance rate for autism in monozygotic twins was 60%, whereas for dizyotic twins it was only 5% (Bailey et al., 1995), indicating that autism is one of the most heritable of psychiatric disorders. In addition, a larger percentage of families than would be expected by chance (2%) have two or more children with autism. Chromosomal abnormalities have also been found in some children with autism (Drew et al., 1996) as well as alterations in brain chemistry (Dawson & Sterling, 2008).

Although biology is clearly a factor in the development of autism, environmental factors play a role as well. There are wide differences in autistic symptoms within monozygotic twin pairs, which suggests that environmental influences play a role in shaping the form that autism will assume (Pennington, 2005; Rutter, 2007). It has also been suggested that exposure to toxic metals such as mercury may contribute to or trigger autism. Research on this important topic is continuing.

TREATING AUTISTIC DISORDER   Autism is a difficult disorder to treat. Professionals treating children with autism have increasingly used medications—especially medication designed to reduce serotonin levels—but although such medications have shown moderate success in reducing some problem behaviors, such as hyperactivity, they have not succeeded in dealing with the core symptoms, primarily self-injurious behavior (Myers, 2007). Moreover, these medications are often accompanied by adverse side effects (Drew & Hardman, 2000). Of the host of treatments tried, **operant behavior therapy** appears to be most effective (Clarke, 2001; McEachin et al., 1993). By carefully monitoring the autistic child's behavior, and by systematically rewarding appropriate behavior with such things as food, operant behavior therapy programs have been quite successful in teaching children with autism basic self-care skills. Unfortunately, though, these time-consuming treatments usually leave children with autism still performing well below the normal range (Clarke, 2001). Such techniques have not been successful in teaching generalizable language skills (Cantwell et al., 1978; Lovaas, 1987). Teaching sign language rather than oral speech, intervening at earlier ages, involving parents in training programs, and working with children in their natural environment are more effective (Clarke, 2001).

operant behavior therapy
A form of behavior therapy in which behavior is carefully monitored and consistently rewarded with such things as food.

Making the Connections 15

There are many links between concepts and ideas in one area of development and concepts and ideas in other areas. Here are some of the connections between ideas in Chapter 15 and discussions in other chapters of this book.

Chapter 15
Developmental Psychopathology

Depression in infants is linked with anxiety and stress during pregnancy.
In Chapter 3, "Prenatal Development and Birth," p. 89

Autism is associated with deficits in recognition of others' mental states.
In Chapter 8, "Cognitive Development: Piaget and Vygotsky," p. 295

Use of alcohol and drugs by children is linked with use patterns of both families and friends.
In Chapter 12, "Expanding the Social World: Peers and Friends," p. 465

SUMMARY

- Children exhibit a wide array of problem behaviors, some of which are relatively common and others quite rare. Many of these behaviors are marked by either a lack of control or excessive internalizing of troublesome issues.

The Developmental Approach to Psychopathology

- **Developmental psychopathology** involves the study of the origins, changes, and continuities in maladaptive behavior over the life span. The four basic principles of developmental psychopathology are (a) the role of development must be considered in interpreting the symptoms of a disorder and in seeking to understand its origins and course; (b) psychopathology must be viewed in relation both to the child's normal development and to the developmental tasks of children of her age; (c) the earliest precursors of disordered behavior must be studied; and (d) there are multiple pathways to both normal and abnormal behavior.

What Is Abnormal?

- Most researchers and clinicians believe **developmental psychopathology** is best thought of as problems in living. The medical model's view of problems as pathological may obscure the role of social judgments that depend on cultural and individual values. The statistical model views as abnormal any behaviors or feelings that differ from the average. Abnormality may also be defined as deviation from the ideal.

- Children are usually referred to mental health professionals by their parents or other adults, and factors other than the child's behavior may influence the referring adult's judgment about the child. Three kinds of factors that may influence the adult's perceptions are the child's characteristics, characteristics of the referring adult, and characteristics of the child's environment.

- Whether or not a particular behavior is viewed as normal depends on the child's age and the likelihood that it will continue over time. Some problems, such as bed-wetting, decline with age; others, such as nightmares, increase until adolescence and then decline. However, some childhood disorders are associated with later adult dysfunction.

Classifying Child Psychopathology

- Two major ways of assessing and classifying developmental psychopathology are the diagnostic

approach and the empirical method. Diagnoses are based on descriptions of clusters of behaviors and disturbing thoughts or feelings classified into various diagnostic categories. A **diagnosis** must convey information about the **etiology** and course of a disorder to be useful. The most widely used diagnostic classification system is the American Psychiatric Association's *DSM-IV*. Although this system has been revised several times, it still presents problems of reliability and validity.

- **Diagnostic reliability** is crucial in a classification system. The empirical approach involves having adults familiar with the child rate a large number of problem behaviors and then using statistical techniques to determine which disorders are related.

- **Undercontrolled disorders**, such as conduct and attention deficit/hyperactivity disorders, are the most frequently reported of all psychological problems of childhood and have considerable impact on the child's social environment. **Overcontrolled disorders**, such as childhood depression, have a greater effect on children themselves, who bottle up their feelings and concerns. Children with **pervasive developmental disorders** such as autism are characterized by gross deficits and extreme disturbances.

Some Psychological Disorders That Affect Children

- Children with either socialized or unsocialized **conduct disorders** repeatedly violate the rights of others or age-appropriate societal norms. Children who violate the law are termed **delinquent** and run the risk of being charged with either **status** or **criminal offenses**. Young offenders commit a sizable percentage of major offenses, and they are also often the victims of violent crime. **Substance abuse**, one kind of conduct disorder, began an upswing in the 1990s. European American youth are more likely than Latino or African American adolescents to use legal and illegal drugs, although the data may not include youth who are dropouts or absent from school. Personal factors, such as anxiety and depression, are significant causes of drug abuse, and the common pathway to abuse starts with legal drugs such as alcohol and tobacco.

- Behavioral techniques, including reinforcement of appropriate behavior and the **time-out** method, are among the most successful treatments for conduct disorders. Prevention programs that involve both family and school show promise.

- **Attention deficit/hyperactivity disorder**, often not diagnosed until children enter the structured environment of school, is characterized by overactivity, impulsivity, poor attention, and difficulties with rule-governed behavior. Although the inappropriate activity of hyperactive children tends to diminish with age, some problems may persist, resulting in poor academic performance.

- Biological explanations for this disorder include minimal brain damage and a genetic component. Environmental explanations, such as dysfunctional parent-child interaction patterns, have received some research support. At present, it appears that hyperactivity may have multiple causes. It is often treated by **psychostimulant medications**, **behavior therapy**, or a combination of the two.

- **Depression in childhood** may be characterized by depressed mood, changes in cognitive functioning such as inability to concentrate, behavioral signs such as irritability and crankiness, and such physical problems as loss of appetite and weight loss. Depression in children is hard to diagnose because children may not be able or willing to talk about feelings of overwhelming sadness until they have reached a certain level of cognitive maturity.

- Diagnoses of depression increase dramatically in adolescence, as does the rate of suicidal thinking and actual suicide attempts. A number of causes of depression have been hypothesized. Biological theories emphasize genetic and biochemical causes. Social and psychological theories suggest such causes as maternal depression and parental conflict. Cognitive theories suggest that feelings of personal inadequacy, or **learned helplessness**, may lead to depression. Antidepressant drugs and **cognitive behavior therapy** are effective treatments for childhood depression.

- The most widely recognized pervasive developmental disorder is **autistic disorder**, which is characterized by a lack of interest in other people, various language abnormalities, and an intense desire to preserve sameness in the environment. **Obsessive self-stimulatory behavior** may be seen as an effort to control sensory stimulation.

- Children with autism sometimes exhibit specific talents in mathematics or the ability to repeat television commercials verbatim, but they score in the retarded range on IQ tests.

- The cause of autism is thought to be biological. Treatment, which has included medication and **operant behavior therapy**, has met with limited success. Although treatment allows the children to develop many skills they would not otherwise acquire, their range of abilities remains quite limited.

EXPLORE AND DISCUSS

1. Are developmental problems of childhood cultur- ally specific or do children in all cultures show all of the same kinds of problems? If you believe these problems are culturally specific, support your answer with examples.

2. Some forms of psychopathology, such as autism, seem more prevalent than they were a decade ago. What do you think may be some of the reasons for the increased incidence of this kind of develop- mental disorder?

3. Why do you think boys are more prone to external- ize problems—for example, to engage in aggressive behavior that is often physical—whereas girls are more likely to internalize their concerns and then to express them in anxiety and depression?

Epilogue

Michael Escoffery (contemporary). *Circle of Love*. 1996. Private Collection.

Throughout this book, we have reviewed the results of many studies of children's development. Beginning in our first chapter, we have described and critiqued theories that attempt to explain and interpret the detailed and complex information amassed by theorists and researchers in their efforts to understand child development. We have also identified and discussed the themes and methods of development that we introduced in Chapter 1. Although psychology's understanding of children's development is vast, much remains that we do not yet understand. And as society and culture change, the process of development also changes. As is true in any field of science, our information is constantly expanding and changing. Child development is a vibrant and exciting area of study, and we are sure you will agree that advancing our knowledge and understanding of the field can contribute substantially to the betterment of society and to the healthy development of children everywhere.

We realize that much of the information discussed in this book will be reexamined and modified in the near future. With this in mind, we have identified some broad principles that characterize, first, our views on the current state of psychology's knowledge about child development and, second, our ideas about knowledge that is on the horizon. In this connection, we make some suggestions about what the field needs to do with respect to both building theory and selecting the kinds of research methods that will make it possible to secure this developing knowledge.

OUR KNOWLEDGE OF CHILD DEVELOPMENT AT PRESENT

1. **The child is competent.** Recent years have seen a dramatic change in our view of the capacities of children. Scientists once considered infants and young children to be helpless, passive creatures who, with limited sensory, perceptual, and social abilities, were simply awaiting the imprint of the adult world. In contrast, today's child psychologists view children as competent and active beings who from an early age possess a wide range of perceptual, motoric, cognitive, emotional, and social capabilities. For example, recent research on early concept development suggests that infants have greater understanding of the world than was previously realized.

2. **The child's behavior is organized.** From the very beginning of children's lives, organization is evident in their behavior. Actions such as sucking and looking are not disorganized reflexes or reactions but highly structured response patterns that enable even newborns to interact with and to learn from the social and physical world. Behavioral organization is evident throughout life; for example, recent research indicates that, with development, children process information in more organized and strategic ways.

3. **The different aspects of psychological development are interdependent.**
   Although developmentalists often focus on distinct areas of growth such as social,
   emotional, physical, linguistic, or cognitive development, all these areas overlap
   and exert mutual influence on each other. Recent research that integrates social,
   emotional, and cognitive development has revealed ways in which these aspects of
   development contribute to and shape each other over time.

4. **The child's behavior has multiple causes.** Current understanding of develop-
   ment suggests that most behaviors have multiple causes and that causation often
   involves interaction among biological, environmental, and experiential fac-
   tors. For example, how genetic predispositions are expressed and when they are
   expressed depend on the environmental conditions in a child's life.

5. **There is no single pathway to normal or abnormal development.** Children may
   take alternative routes to normal development; no single pathway is necessarily
   the "best" one to follow. It is a well-established observation that individual adults
   who are intellectually and socially competent often have reached their goals by
   very different routes. Children's development is profoundly influenced both by
   varying kinds of experiences and by the timing of these experiences. At one time
   or another, a child may confront a risk with greater or less resilience. Moreover,
   these same principles hold true with respect to development that is less than ideal:
   Children whose lives become dysfunctional to one degree or another may reach
   this state by a variety of pathways.

6. **The child's development is generally continuous but is marked by periods of
   more rapid, more dramatic change.** These periods of change are often accom-
   panied by the onset of biological and social changes, such as puberty and school
   transitions, or by unexpected or nonnormative events, such as the loss of a parent
   or of a friendship or a natural disaster or the loss of parental employment. In addi-
   tion, the characterization of development as continuous or discontinuous depends,
   in part, on how closely we look. A detailed examination will reveal that even
   though developmental progress is, in the main, quite gradual, periods of rapid
   developmental advance sometimes occur. For example, children have rapid peri-
   ods of growth and weight gain followed by periods of little or no change.

7. **Development is a lifelong process.** Although this book focuses on the develop-
   ment of the child, it is important to recognize that the adults who are influential in
   a child's development continue to develop throughout their own lives—physically,
   socially, emotionally, and cognitively. As human beings in every stage of the life
   cycle, we respond to, learn from, and change through experiences of many kinds.
   So to understand children, we need to recognize that their development occurs
   in the context of the continuing development experienced by their parents and by
   other socializing agents.

8. **The child influences other people.** As children grow, they influence the behavior
   of the adults and children with whom they interact. Even infants play an active
   role in modifying the behaviors of their parents and others by smiling and crying.
   As children get older and they interact with parents and other adults in problem-
   solving activities, the behaviors children display inform more experienced part-
   ners as to how to help children participate in ways that support their learning
   needs. Now widely accepted, this *bidirectional* view of development underscores
   the fact that children play an influential part in their own development.

9. **The child's behavior varies across situations and settings.** One important
   feature of human behavior is the ability to adapt to the demands of different situa-

tions. The same child may behave differently with different people or in different situations—in the home, the laboratory, the school, or the peer play group. Thus, we need to study children in multiple settings and to exercise caution in generalizing our interpretations of children's behaviors from one situation to another.

10. **The child's behavior is influenced by social systems.** The child is embedded in a variety of systems, and the members of these systems influence one another's behavior. Social systems range from the smaller and more immediate, such as the family or the peer group, to the larger and more remote, such as the school, the community, the media, or the greater society. The child may have considerable influence in smaller systems but often has less control in larger ones.

11. **Child development occurs in a cultural context.** Cultural contributions to development are important and complex. In multicultural societies like the United States or Canada, because cultural systems range from the ethnic neighborhood to the broader culture of the society at large, children experience a number of cultural influences. In other societies in which most members share a similar cultural background, this cultural context greatly influences the developing child. In all types of cultural settings, tensions among the generations may evolve as elders expect younger people to carry on valued cultural traditions and the young resist these expectations. To achieve a full understanding of child development, we need to pay attention to both intercultural and intracultural variations in children's experience.

12. **Children develop in a historical context.** As social conditions shift, children and families undergo changes that alter their behavior. The experiences of children who grew up in the Great Depression of the 1930s differed dramatically from those of children growing up in the current century. The changes in gender roles that have occurred in the mid- and late-20th century have altered family lifestyles. When both parents work outside the home and divide household labor differently, children's lives are altered, too. As contact with cultures around the world continues to increase through media, travel, immigration, trade, and other forms of globalization, these experiences will undoubtedly exert a huge force on child development. One of the aims of child psychology is to examine these and other changes so as to determine how they affect children's behavior.

KNOWLEDGE ON THE HORIZON

1. **Child psychologists need to employ multiple research methods.** In examining the complex and multifaceted aspects of children's development, we cannot rely on any single research method. A wide variety of methods, including naturalistic observations, laboratory and field experiments, self-reports, clinical studies, genetic and neurological measures, and standardized tests can provide us with different types of information about children. In addition, we need to gather information from the many different people who interact with children, including parents, peers, and teachers. With the information that each of these people can provide and the unique perspectives that each offers, we will gain a broader and deeper understanding of the developing child.

2. **Child psychologists need multiple samples.** To fully understand how children grow and develop, we need to select multiple samples in our research. Doing so will enable us to capture the cultural and ethnic richness—the diversity—of children's development, both within the United States and throughout the world.

3. **Child psychologists need multiple theories of development.** Theories like those of Piaget, Freud, and Vygotsky—theories that attempt to provide a full and comprehensive account of development—have inspired a great deal of very useful research. Contemporary psychologists believe, however, that the complex and multidetermined nature of development requires us to explain smaller pieces of the developmental puzzle before we attempt to assemble an all-encompassing theory. Thus, today's developmental psychologists are more likely to advance theories of more specific phenomena—such as gender typing, memory function, aggression, or language development—than to formulate the kinds of grand theories that were put forward during much of the 20th century.

4. **A full understanding of child development will require a multidisciplinary effort.** Many scientific disciplines besides child psychology contribute in important ways to our understanding of children. For example, anthropology provides a cross-cultural perspective on child socialization, and sociology offers a societal viewpoint on the systems and institutions that children experience. Pediatrics illuminates the role of physical health in the child's development, while clinical psychology and psychiatry offer an understanding of deviant and abnormal development in children. Finally, history views children's development through the lens of time. Multidisciplinary approaches are increasingly common in studies of children's development, as they are in other areas of scientific study.

5. **Child development research influences, and is influenced by, social policy.** As we have stressed throughout this book, research in child development and the application of its findings are closely linked. For example, basic research on the importance of development of children's early environment stimulated government efforts like Head Start and the growth of child-care programs. Child psychologists are actively involved in issues of concern to society, such as poverty, problems of family breakdown, schooling that accommodates different cultural styles of learning, and the influence on the growing child of violent and sexual content in television and other media, including the Internet. Contributing to the formation and evaluation of social policy that affects children is both an opportunity and a responsibility of the field of child development.

Glossary

accommodation Modifying an existing schema to fit a new experience.

achievement motivation A person's tendency to strive for successful performance, to evaluate her performance against standards of excellence, and to feel pleasure at having performed successfully.

acquired immune deficiency syndrome (AIDS) A viral disease that attacks the body's immune systems; transmitted to a fetus or newborn in the form of the *human immunodeficiency virus (HIV)*, this disorder weakens the child's immune system and may ultimately cause its death.

active genetic-environmental interaction A kind of interaction in which people's genes encourage them to seek out experiences compatible with their inherited tendencies.

adaptation Adjusting one's thinking to fit with environmental demands.

age cohort People born within the same generation.

age of viability The age of 22 to 26 weeks from conception, at which point the fetus's physical systems are advanced enough that it has a chance to survive if born prematurely.

aggression Behavior that intentionally harms other people by inflicting pain or injury on them.

aggressive rejected children *Rejected* children who have low self-control, are highly aggressive, and exhibit behavior problems.

allele An alternate form of a gene; typically, a gene has two alleles, one inherited from the individual's mother, and one from the father.

alphafetoprotein (AFP) assay A maternal blood test performed prenatally to detect such problems as Down syndrome, the presence of multiple embryos, and defects of the central nervous system.

altruism An unselfish concern for the welfare of others.

altruistic behavior Intrinsically motivated behavior that is intended to help others without expectation of acknowledgment or concrete reward.

amniocentesis A technique for sampling and assessing fetal cells for indications of abnormalities in the developing fetus; performed by inserting a needle through the abdominal wall and into the amniotic sac and withdrawing a small amount of the amniotic fluid.

amniotic sac A membrane that contains the developing organism and the amniotic fluid around it; sac and fluid protect the organism from physical shocks and temperature changes.

androgynous Possessing both feminine and masculine psychological characteristics.

animistic thinking The attribution of life to inanimate objects.

anorexia nervosa An eating disorder in which people, usually young women, are preoccupied with avoiding obesity and often diet to the point of starvation.

approach/avoidance behavior A pattern of interaction in which the infant or child shows an inconsistent pattern of approaching and retreating from a person or an object.

assimilation Applying an existing schema to a new experience.

associative learning According to Jensen, lower level learning tapped in tests of such things as short-term memorization and recall, attention, rote learning, and simple associative skills. Also called *level I* learning.

attachment A strong emotional bond that forms between infant and caregiver in the second half of the child's first year.

Attachment Q Sort (AQS) An assessment method in which a caregiver or observer judges the quality of a child's attachment based on the child's behavior in naturalistic situations, often including brief separations from parents.

attention The identification and selection of particular sensory input for more detailed processing.

attention deficit/hyperactivity disorder (ADHD) A childhood disorder characterized by a persistent pattern of inattention and hyperactivity or impulsivity that far exceeds such behaviors observed in children at comparable levels of development.

authoritarian parenting Parenting that is harsh, unresponsive, and rigid and in which parents tend to use power-assertive methods of control.

authoritative parenting Parenting that is warm, responsive, and involved yet unintrusive and in which parents set reasonable limits and expect appropriately mature behavior from their children.

autistic disorder A disorder in which children's ability to communicate and interact socially is seriously impaired; children with autism have specific language deficiencies, demonstrate a need for sameness in their environment, and often engage in repetitive and stereotyped kinds of behaviors.

autobiographical memory A collection of memories of things that have happened to a person at a specific time or place.

automatization The process of transforming conscious, controlled behaviors into unconscious and automatic ones.

autosomes The 22 paired non-sex chromosomes.

autostimulation theory The theory that during REM sleep the infant's brain stimulates itself and that this, in turn, stimulates early development of the central nervous system.

average children Children who have some friends but who are not as well liked as popular children.

babbling An infant's production of strings of consonant-vowel combinations.

basic reflex activity An infant's exercise of, and growing proficiency in, the use of innate reflexes.

Bayley Scales of Infant Development A set of nonverbal tests that measure specific developmental milestones and are generally used with children thought to be at risk for abnormal development.

behaviorism A learning perspective that holds that theories of psychology must be based on observations of behavior rather than on speculations about motives or unobservable factors.

behavior therapy A psychological form of treatment, often used in treating conduct disorders, that is based on such learning principles as reinforcement and social learning.

bilingualism The acquisition of two languages.

brain hemispheres The two halves of the brain's cerebrum, left and right.

Brazelton Neonatal Assessment Scale A scale containing a battery of tests used to measure an infant's sensory and perceptual capabilities, motor development, range of states, and ability to regulate these states, as well as whether the brain and central nervous system are properly regulating involuntary responses.

bulimia nervosa An eating disorder in which people, usually young women, alternate periods of binge eating with vomiting and other means of compensating for the weight gained.

canalization The genetic restriction of a phenotype to a small number of developmental outcomes, permitting environmental influences to play only a small role in these outcomes.

case study method A form of research in which investigators study an individual person or group very intensely.

catch-up growth The tendency for human beings to regain a normal course of physical growth after injury or deprivation.

categorical speech perception The tendency to perceive as the same a range of sounds belonging to the same phonemic group.

catharsis Presumably, discharging aggressive impulses by engaging in actual or symbolic aggressive acts that do not impinge on another person.

center care A child-care context in which children are cared for in a "school-like" environment by professional caregivers.

centration Focusing one's attention on only one dimension or characteristic of an object or situation.

cephalocaudal The pattern of human physical growth in which development begins in the area of the brain and proceeds downward to the trunk and legs.

cerebral cortex The covering layer of the cerebrum that contains the cells that control specific functions such as seeing, hearing, moving, and thinking.

cerebrum The two connected hemispheres of the brain.

cesarean delivery The surgical delivery of a baby; the baby is removed from the mother's uterus through an incision made in her abdomen and uterus in a procedure also known as *cesarean section*.

classical conditioning A type of learning in which two stimuli are repeatedly presented together until individuals learn to respond to the unfamiliar stimulus in the same way they respond to the familiar stimulus.

child development A field of study that seeks to account for the gradual evolution of the child's cognitive, social, and other capacities first by describing changes in the child's observed behaviors and then by uncovering the processes and strategies that underlie these changes.

chlamydia Probably the most widespread bacterial sexually transmitted disease; can cause pneumonia or a form of conjunctivitis in a pregnant woman's baby.

chorionic villi sampling A technique for sampling and assessing cells withdrawn from the chorionic villi, projections from the chorion that surrounds the amniotic sac; cells are withdrawn either through a tube inserted into the uterus through the vagina or through a needle inserted through the abdominal wall.

chromosomes Threadlike structures, located in the nucleus of a cell, that carry genetic information to help direct development.

chronosystem The time-based dimension that can alter the operation of all other systems in Bronfenbrenner's model, from *microsystem* through *macrosystem*.

clique A voluntary group formed on the basis of friendship.

codominance A genetic pattern in which heterozygous alleles express the variants of the trait for which they code simultaneously and with equal force.

cognition The mental activity through which human beings acquire and process knowledge.

cognitive behavior therapy A group therapy technique particularly useful in treating depression in adolescents. Therapeutic goals include reducing self-consciousness and feelings of being different and teaching strategies for dealing with depressive moods and for acquiring a more positive outlook and improving social interactions.

cognitive developmental view of attachment The view that to form attachments infants must differentiate between mother and stranger and understand that people exist independent of the infant's interaction with them.

cognitive developmental theory of gender typing Kohlberg's theory that children use physical and behavioral clues to differentiate gender roles and to gender-type themselves very early in life.

cognitive learning According to Jensen, higher level learning tapped in tests of such things as abstract thinking, symbolic processing, and the use of language in problem solving. Also called *level II* learning.

cognitive map A mental representation of the spatial layout of a physical or geographic place.

cognitive processes Ways that the human mental system operates on information.

cognitive social learning theory A learning theory that stresses the importance of observation and imitation in the acquisition of new

behaviors, with learning mediated by cognitive processes.

colic A prolonged period of unexplained crying by an infant.

communicative competence The ability to convey thoughts, feelings, and intentions in a meaningful and culturally patterned way.

community of learners An approach to classroom learning in which adults and children work together in shared activities, peers learn from each other, and the teacher serves as a guide.

comorbidity The co-occurrence of two or more problem behaviors.

concrete operations stage Stage in which the child is able to reason logically about materials that are physically present.

conduct disorder A disorder characterized by a repetitive and persistent pattern of behavior in which a young person violates the basic rights of others or major age-appropriate societal norms or rules.

congenital Characteristic acquired during development in the uterus or during the birth process and not through heredity.

connectionist models Information-processing approaches that describe mental processes in terms of the interconnections of the neural network.

conscience The child's internalized values and standards of behavior.

conservation The understanding that altering an object's or a substance's appearance does not change its basic attributes or properties.

constructivist view The idea that children actively create their understanding of the world as they encounter new information and have new experiences.

control group In an experiment, the group that is not exposed to the treatment, or the *independent variable*.

control phase According to Kopp, the first phase in learning self-regulation, when children are highly dependent on caregivers to remind them about acceptable behaviors.

controversial children Children who are liked by many peers but also disliked by many.

conventional level Kohlberg's second level of moral development, in which the child's behavior is designed to solicit others' approval and maintain good relations with them. The child accepts societal regulations unquestioningly and judges behavior as good if it conforms to these rules.

cooing A very young infant's production of vowellike sounds.

coordination of secondary circular reactions An infant's combination of different schemas to achieve a specific goal.

coparenting Parenting in which spouses work together as a team, coordinating their child-rearing practices with each other; coparenting can be cooperative, hostile, or characterized by different levels of investment in the parenting task.

core knowledge systems Ways of reasoning about ecologically important objects and events, such as the solidity and continuity of objects.

corpus callosum The band of nerve fibers that connects the two hemispheres of the brain.

correlational method A research design that permits investigators to establish relations among variables as well as assess the strength of those relations.

creativity The ability to solve problems, create products, or pose questions in a way that is novel or unique.

creole language A language spoken by children of pidgin-language speakers that, in contrast with pidgin, is highly developed and rule governed.

criminal offense Behavior that is illegal.

critical period A specific period in children's development when they are sensitive to a particular environmental stimulus that does not have the same effect on them when encountered before or after this period.

crossing over The process by which equivalent sections of homologous chromosomes switch places randomly, shuffling the genetic information each carries.

cross-sectional method A research method in which researchers compare groups of individuals of different age levels at approximately the same point in time.

crowd A collection of people whom others have stereotyped on the basis of their perceived shared attitudes or activities—for example, populars or nerds.

culture-fair test A test that attempts to minimize cultural biases in content that might influence the test taker's responses.

cumulative risk The notion that risk factors in children's life circumstances have cumulative negative effects on their intellectual performance.

deductive reasoning Logical thinking that involves reaching a necessary and valid conclusion based on a set of premises.

deferred imitation Mimicry of an action some time after having observed it; requires that the child have some sort of mental representation of the action.

delay gratification To put off until another time possessing or doing something that gives one pleasure.

delinquency Juvenile behavior in violation of the law.

deoxyribonucleic acid (DNA) A ladderlike molecule that stores genetic information in cells and transmits it during reproduction.

dependent variable The variable, or factor, that researchers expect to change as a function of change in the independent variable.

depression in childhood Like adult depression, a mood disorder often manifested in a depressed mood and loss of interest in familiar activities but also likely to be expressed as irritability and crankiness. Difficulty concentrating or focusing on tasks and concomitant drops in school grades are not uncommon, and children with depression often complain of physical problems such as headache.

developmental psychopathology The investigation of the origins, course, changes, and continuities in disordered or maladaptive behavior over a person's life span.

deviation IQ An IQ score that indicates the extent to which a person's performance on a test deviates from age-mates' average performance.

diagnosis The identification of a physical or mental disorder on the

basis of symptoms and of knowledge of the cause or causes of the disorder and its common course. A diagnosis may also include information about effective forms of treatment.

diagnostic reliability A measure of how often two or more clinicians arrive independently at the same diagnosis of a particular disorder.

diethylstilbestrol (DES) A synthetic hormone once prescribed for pregnant women to prevent miscarriage but discontinued when cancer and precancerous conditions were detected in their children.

direct observation A method of observation in which researchers go into settings in the natural world or bring participants into the laboratory to observe behaviors of interest.

discourse Socially based conversation.

dizygotic Characterizing *fraternal* twins, who have developed from two separate fertilized eggs.

dominance hierarchy An ordering of individuals in a group from most to least dominant; a "pecking order."

dominant The more powerful of two alleles in a heterozygous combination.

Down syndrome A form of chromosome abnormality in which the person suffers disabling physical and mental development and is highly susceptible to such illnesses as leukemia, heart disorders, and respiratory infections.

dynamic systems theory A theory that proposes that individuals develop and function within systems and that studies the relationships among individuals and systems and the properties by which these relationships operate.

dyslexia A term for the difficulties some people experience in reading or in learning to read.

ecological theory A theory of development that stresses the importance of understanding not only the relationships between organisms and various environmental systems but also the relations among such systems themselves.

ecological validity The degree to which a research study accurately represents events or processes that occur in the natural world.

ego In Freudian theory, the rational, controlling component of the personality, which tries to satisfy needs through appropriate, socially acceptable behaviors.

egocentric speech According to Vygotsky, a form of self-directed dialogue by which the child instructs herself in solving problems and formulating plans; as the child matures, this becomes internalized as *inner speech*.

egocentrism The tendency to view the world from one's own perspective and to have difficulty seeing things from another's viewpoint.

elaboration A memory strategy in which one adds to information to make it more meaningful and thus easier to remember.

elementary mental functions Psychological functions with which the child is endowed by nature, including attention, perception, and involuntary memory, that emerge spontaneously during children's interaction with the world.

embryo The developing organism between the second and eighth week of gestation; the embryonic period comprises the differentiation of the major physiological structures and systems.

emotional display rules Rules that dictate which emotions one may appropriately display in particular situations.

emotional script A complex scheme that enables a child to identify the emotional reaction likely to accompany a particular sort of event.

emotions Subjective reactions to the environment that are usually experienced cognitively as either pleasant or unpleasant, generally accompanied by physiological arousal, and often expressed in some visible form of behavior.

empathy The capacity to experience the same emotion that someone else is experiencing.

encoding The transformation of information from the environment into a mental representation.

ends over means focus Consideration of only the end state of a problem in evaluating an event; failure to consider the means by which that end state was obtained.

episodic memory Memory for specific events, often autobiographical in nature.

estrogens Hormones that, in the female, are responsible for sexual maturation.

ethological theory A theory that holds that behavior must be viewed and understood as occurring in a particular context and as having adaptive or survival value.

ethological theory of attachment Bowlby's theory that attachment derives from the biological preparation of both infant and parents to respond to each other's behaviors in such a way that parents provide the infant with care and protection.

etiology In medicine and psychiatry, the cause or causes of a specific disorder.

evocative genetic-environmental interaction The expression of the genes' influence on the environment through an individual's inherited tendencies to evoke certain environmental responses; for example, a child's smiling may elicit smiles from others.

evolutionary psychology An approach that holds that critical components of psychological functioning reflect evolutionary changes and are critical to the survival of the species.

executive control process A cognitive process that serves to control, guide, and monitor the success of a problem-solving approach a child uses.

executive control structure According to Case, a mental blueprint or plan for solving a class of problems.

exosystem The collection of settings, such as a parent's daily work, that impinge on a child's development but in which the child does not play a direct role.

expansion A technique adults use in speaking to young children in which they imitate and expand or add to a child's statement.

experience-dependent processes Brain processes that are unique to the individual and responsive to particular cultural, community, and family experiences.

experience-expectant processes Brain processes that are universal, experienced by all human beings across evolution

experimental group In an experiment, the group that is exposed to the treatment, or the *independent variable*.

expressive characteristics Presumably typical of females, these characteristics include nurturance and concern with feelings.

extended family A family that includes relatives such as grandparents, aunts, uncles, nieces, and nephews within the basic family unit of parents and children.

factor analysis A statistical procedure used to determine which of a number of factors, or scores, are both closely related to each other and relatively independent of other groups of factors, or scores.

Fagan Test of Infant Intelligence A test of how infants process information, including encoding attributes of objects and seeing similarities and differences across objects.

family child care A child-care arrangement in which an individual cares for three or four children in her home.

fetal alcohol syndrome A disorder exhibited by infants of alcoholic mothers and characterized by stunted growth, a number of physical and physiological abnormalities, and often, mental retardation.

fetus The developing organism from the third month of gestation through delivery; during the fetal period, bodily structures and systems develop to completion.

field experiment An experiment in which researchers deliberately create a change in a real-world setting and then measure the outcome of their manipulation.

Flynn effect Increase in the average IQ score in the populations of the United States and other developed countries since the early 1900s, a phenomenon identified by J. R. Flynn.

formal operations stage Stage in which the child becomes capable of abstract thinking, complex reasoning, and hypothesis testing.

fragile X syndrome A form of chromosomal abnormality, more common in males than in females, in which an area near the tip of the X chromosome is narrowed and made fragile due to a failure to condense during cell division. Symptoms include physical, cognitive, and social problems.

friendship A reciprocal commitment between two people who see themselves more or less as equals.

gender-based beliefs Ideas and expectations about what is appropriate behavior for males and females.

gender constancy The awareness that superficial alterations in appearance or activity do not alter gender.

gender identity The perception of oneself as either masculine or feminine.

gender role preference The desire to possess certain gender-typed characteristics.

gender roles Composites of the behaviors actually exhibited by a typical male or female in a given culture; the reflection of a gender stereotype in everyday life.

gender-schema theory The notion that children develop schemas, or naive theories, that help them organize and structure their experience related to gender differences and gender roles.

gender stability The notion that gender does not change; males remain male and females remain female.

gender stereotypes Beliefs that members of a culture hold about how females and males should behave; that is, what behaviors are acceptable and appropriate for each sex.

gender typing The process by which children acquire the values, motives, and behaviors considered appropriate for their gender in their particular culture.

gene A portion of DNA located at a particular site on a chromosome and that codes for the production of certain kinds of proteins.

general factor (*g*) General mental ability involved in all cognitive tasks.

generalization The application of a strategy learned while solving a problem in one situation to a similar problem in a new situation.

genital herpes A common viral infection spread primarily through sexual contact; if contracted by an infant during birth, it can cause blindness, motor abnormalities, mental retardation, and a wide range of neurological disorders.

genotype The particular set of genes a person inherits from his or her parents.

gestation The carrying of an embryo or fetus during pregnancy, usually for 9 months in humans.

glial cell A nerve cell that supports and protects neurons and serves to encase them in *myelin sheaths*.

gonorrhea A sexually transmitted bacterial infection that, in a pregnant woman, can cause blindness in her infant; normally treatable with antibiotics.

goodness of fit A measure of the degree to which a child's temperament is matched by her environment; the more effectively parents and other agents of socialization accept and adapt to the child's unique temperament, the better this "fit."

grammar The structure of a language; consists of *morphology* and *syntax*.

guided participation Learning that occurs as children participate in activities of their community and are guided in their participation by the actions of more experienced partners in the setting.

habituation A process of learning by which an individual reacts with less and less intensity to a repeatedly presented stimulus, eventually responding only faintly or not at all.

Head Start A federally funded program that provides disadvantaged young children with preschool experience, social services, and medical and nutritional assistance.

hedonistic reasoning Making a decision to perform a prosocial act on the basis of expected material reward.

hemispheric specialization Differential functioning of the two cerebral hemispheres; the left controlling the right side of the body, the right controlling the left side.

hemophilia A disorder, caused by an X-linked recessive gene, in which the blood fails to clot; found more often in males than in females.

heritability factor A statistical estimate of the contribution heredity makes to a particular trait or ability.

heterozygous The state of an individual whose alleles for a particular trait from each parent are different.

hierarchical categorization The organization of concepts into levels of abstraction that range from the specific to the general.

higher mental functions Psychological functions, such as voluntary attention, complex memory processes, and problem solving, that entail the coordination of several cognitive processes and the use of *mediators*.

holophrase A single word that appears to represent a complete thought.

homozygous The state of an individual whose alleles for a particular trait from each parent are the same.

horizontal décalage The term Piaget used to describe unevenness in children's thinking within a particular stage; for example, in developing an understanding of conservation, children conserve different objects or substances at different ages.

hormones Powerful and highly specialized chemical substances that are produced by the cells of certain body organs and that have a regulatory effect on the activity of certain other organs.

hostile aggression Directing aggressive behavior at a particular person or group, criticizing, ridiculing, tattling on, or calling names.

human behavior genetics The study of the relative influences of heredity and environment on the evolution of individual differences in traits and abilities.

Huntington disease A genetically caused, fatal disorder of the nervous system that begins in mid-adulthood and is manifested chiefly in uncontrollable spasmodic movements of the body and limbs and eventual mental deterioration.

id In Freudian theory, the person's instinctual drives; the first component of the personality to evolve, the id operates on the basis of the *pleasure principle*.

identification The Freudian notion that children acquire gender identity by identifying with and imitating their same-sex parents.

immanent justice The notion that any deviation from rules will inevitably result in punishment or retribution.

imprinting The process by which birds and other infrahuman animals develop a preference for the person or object to which they are first exposed during a brief, critical period after birth.

inclusion A policy by which children of all ability levels, whether learning disabled, physically handicapped, or mentally retarded, are included in the same classroom.

independent variable The variable, or factor, that researchers deliberately manipulate in an experiment.

infant-directed, or **child-directed, speech** A simplified style of speech parents use with young children, in which sentences are short, simple, and often repetitive and the speaker enunciates especially clearly, slowly, and in a higher pitched voice, often ending with a rising intonation. Also called *motherese*.

infant state A recurring pattern of arousal in the newborn, ranging from alert, vigorous, wakeful activity to quiet, regular sleep.

information-processing approaches Theories of development that focus on the flow of information through the child's cognitive system and particularly on the specific operations the child performs between input and output phases.

informed consent Agreement, based on a clear and full understanding of the purposes and procedures of a research study, to participate in that study.

inner speech Internalized egocentric speech that guides intellectual functioning.

insecure-avoidant attachment A type of attachment shown by babies who seem not to be bothered by their mothers' brief absences but specifically avoid them on their return, sometimes becoming visibly upset.

insecure-disorganized attachment A type of attachment shown by babies who seem disorganized and disoriented when reunited with their mothers after a brief separation.

insecure-resistant attachment A kind of attachment shown by babies who tend to become very upset at the departure of their mothers and who exhibit inconsistent behavior on their return, sometimes seeking contact, sometimes pushing their mothers away.

instrumental aggression Quarreling and fighting with others over toys and possessions.

instrumental characteristics Presumably typical of males, these characteristics include task and occupation orientation.

intellectual giftedness A characteristic defined by an IQ score of 130 or over; gifted children learn faster than others and may show early exceptional talents in certain areas.

intelligence quotient (IQ) An index of the way a person performs on a standardized intelligence test relative to the way others her age perform.

intent community participation Children's participation in the authentic activities of their community with the purpose of learning about the activity.

intermodal perception The use of sensory information from more than one modality to identify a stimulus and make sense of it; also, the identification of a stimulus already identified by means of one modality by the use of another modality.

internal working model According to Bowlby, a person's mental representation of himself as a child, his parents, and the nature of his interaction with his parents, as he reconstructs and interprets that interaction; also referred to as an *attachment representation*.

intuitive substage The second substage of the preoperational stage during which the child begins to solve problems by using mental

operations but cannot explain how she arrives at the solutions.

inventing new means by mental combination Children begin to combine schemas mentally and rely less on physical trial and error.

iron-deficiency anemia A disorder in which inadequate amounts of iron in the diet cause listlessness and may retard a child's physical and intellectual development.

joint legal custody A form of child custody in which both parents retain and share responsibility for decisions regarding the child's life, although the child usually resides with one parent.

joint physical custody As in joint legal custody, parents make decisions together regarding their child's life, but they also share physical custody so that the child lives with each parent for a portion of the year.

Kaufman Assessment Battery for Children (K-ABC) An intelligence test designed to measure several types of information- processing skills as well as achievement in some academic subjects.

Klinefelter's syndrome A form of chromosome abnormality in which a male inherits an extra X sex chromosome, resulting in the XXY pattern; many feminine physical characteristics, language deficits, and, sometimes, mental retardation are present.

laboratory experiment A research design that allows investigators to determine cause and effect by controlling variables and treatments and assigning participants randomly to treatments.

language A communication system in which words and their written symbols combine in rule-governed ways and enable speakers to produce an infinite number of messages.

language acquisition device (LAD) Chomsky's proposed mental structure in the human nervous system that incorporates an innate concept of language.

language acquisition support system (LASS) According to Bruner, a collection of strategies and tactics that environmental influences—initially, a child's parents or primary caregivers—provide the language-learning child.

lanugo A fine, soft hair that covers the fetus's body from about the fifth month of gestation on; may be shed before birth or after.

latchkey children Children who must let themselves into their homes after school because one parent or both parents are working outside the home.

lateralization The process by which each half of the brain becomes specialized for certain functions—for example, the control of speech and language by the left hemisphere and of visual-spatial processing by the right.

learned helplessness A kind of behavior that results from the belief that one is helpless to control the events in one's world.

learning disabilities Deficits in one or more cognitive processes important for learning.

learning theory of attachment The theory that infants become attached to their mothers because a mother provides food, or primary reinforcement, and thus becomes a secondary reinforcer.

life-span perspective A view of development as a process that continues throughout the life cycle, from infancy through adulthood and old age.

longitudinal method A method in which investigators study the same people repeatedly at various times in the participants' lives.

long-term memory The mental processing unit in which information may be stored permanently and from which it may later be retrieved.

macrosystem The system that surrounds the *microsystem, mesosystem*, and *exosystem*; represents the values, ideologies, and laws of the society or culture.

maturation A genetic or biologically determined process of growth that unfolds over a period of time.

mediational deficiency Inability to use strategies to store information in long-term memory.

mediators Psychological tools and signs—such as language, counting, mnemonic devices, algebraic symbols, art, and writing—that facilitate and direct thinking processes.

meiosis The process by which a germ cell divides to produce new germ cells with only half the normal complement of chromosomes; thus male and female germ cells (sperm and ovum) each contain only 23 chromosomes so that when they unite, the new organism they form will have 46 chromosomes, half from each parent.

memory span The amount of information one can hold in short-term memory.

menarche In females, the beginning of the menstrual cycle.

mental age An index of a child's actual performance on an intelligence test compared with his true age.

mental representation Information stored mentally in some form (e.g., verbal, pictorial, procedural).

mental retardation A characteristic defined by an IQ score below 70 together with difficulty in coping with age-appropriate activities of everyday life.

mesosystem The interrelations among the components of the *microsystem*.

metacognition The individual's knowledge about knowing and his control of cognitive activities.

metalinguistic awareness The understanding that language is a rule-bound system of communicating.

microgenetic analysis A very detailed examination of how a child solves a problem.

microsystem In Bronfenbrenner's ecological theory, the context in which children live and interact with the people and institutions closest to them, such as parents, peers, and school.

miscarriage The natural or spontaneous end of a pregnancy before the infant is capable of survival outside the womb and generally defined in humans as prior to 20 weeks gestation.

mitosis The process in which a body cell divides in two, first dupli-

cating its chromosomes so that the new daughter cells produced each contain the usual 46 chromosomes.

modifier genes Genes that exert their influence indirectly, by affecting the expression of still other genes.

monozygotic Characterizing *identical* twins, who have developed from a single fertilized egg.

morality of reciprocity Piaget's third stage of moral development, in which the child recognizes that rules may be questioned and altered, considers the feelings and views of others, and believes in equal justice for all.

moral realism Piaget's second stage of moral development, in which the child shows great respect for rules but applies them quite inflexibly.

morpheme A language's smallest unit of meaning, such as a prefix, a suffix, or a root word.

morphology The study of morphemes, language's smallest units of meaning.

multischematic Possessing both multiple cultural schemas for responding to the environment and the necessary criteria for deciding what schema to use in a particular situation.

multistore model A model of information processing in which information moves through a series of organized processing units—*sensory register*, *short-term memory*, and *long-term memory*.

mutual antipathy A relationship of mutual dislike between two people.

myelination The process by which glial cells encase neurons in sheaths of the fatty substance *myelin*.

naming explosion The rapid increase in vocabulary that the child typically shows at about the age of 1.5 years.

narrative form A temporally sequenced account that conveys meaning about an event.

national survey A method of sampling in which a very large, nationally representative group of people are selected for a particular study.

natural experiment An experiment in which researchers measure the results of events that occur naturally in the real world.

needs-oriented reasoning Reasoning in which children express concern for others' needs even though their own needs may conflict with those needs.

negative gossip Sharing some negative information about another child with a peer.

neglected children Children who are often socially isolated and, although they are not necessarily disliked by others, have few friends.

neonate A newborn baby.

neo-Piagetian theories Theories of cognitive development that reinterpret Piaget's concepts from an information-processing perspective.

neural migration The movement of neurons within the brain that ensures that all brain areas have a sufficient number of neural connections.

neuron A cell in the body's nervous system, consisting of a cell body, a long projection called an *axon*, and several shorter projections called *dendrites*; neurons send and receive neural impulses, or messages, throughout the brain and nervous system.

neuron proliferation The rapid formation of neurons in the developing organism's brain.

neuronal death The death of some neurons that surround newly formed synaptic connections among other neurons; also called *programmed cell death*.

niche picking Seeking out or creating environments compatible with one's genetically based predispositions.

nonaggressive rejected children *Rejected* children who tend to be anxious, withdrawn, and socially unskilled.

nonshared environment A set of conditions or activities experienced by one child in a family but not shared with another child in the same family.

nucleotide A compound containing a nitrogen base, a simple sugar, and a phosphate group.

obesity A condition in which a person's weight is 30% or more in excess of the average weight for his or her height and frame.

object permanence The notion that entities external to the child, such as objects and people, continue to exist independent of the child's seeing or interacting with them.

observer bias The tendency of observers to be influenced in their judgments by their knowledge of the hypotheses guiding the research.

obsessive self-stimulatory behavior Behavior common in children with autism in which they engage in repetitive actions that seemingly have no purpose.

operant behavior therapy A form of behavior therapy in which behavior is carefully monitored and consistently rewarded with such things as food.

operant conditioning A type of learning that depends on the consequences of behavior; rewards increase the likelihood that a behavior will recur, whereas punishment decreases that likelihood.

operations Schemas based on internal mental activities.

organization Combining simple mental structures into more complex systems, a term used by Piaget or also refers to a memory strategy that involves putting together in some organized form the information to be remembered; usually entails categorization and hierarchical relations.

overcontrolled disorders A group of psychological disturbances in which a child appears overly controlled, withdrawing from others, lacking spontaneity, and generally appearing to be not a happy child.

overextension The use, by a young child, of a single word to cover many different things.

overregularization The application of a principle of regular change to a word that changes irregularly.

ovum The female germ cell, or egg.

passive genetic-environmental interaction The interactive environment created by parents with particular genetic predispositions who encourage the expression of these tendencies in their children.

patterned speech A form of pseudo-speech in which the child utters strings of phonemes that sound very much like real speech but are not.

peer-group network The cluster of peer acquaintances who are familiar with and interact with one another at different times for common play or task-oriented purposes.

peer victimization Ill treatment of one child by another (or by others) that can range from teasing to bullying to serious physical harm; typically, victimizing is a continuing behavior that persists over time.

perception The interpretation of sensations to make them meaningful.

permissive parenting Parenting that is lax and in which parents exercise inconsistent discipline and encourage children to express their impulses freely.

pervasive developmental disorders Childhood disorders characterized by gross deficits in many areas of cognitive, emotional, and social development that are linked with severe and pervasive impairment of social interaction and communication skills.

phenotype The visible expression of the person's particular physical and behavioral characteristics; created by the interaction of a person's genotype, or genetic makeup, with the environment.

phenylketonuria (PKU) A disease caused by a recessive allele that fails to produce an enzyme necessary to metabolize the protein phenylalanine; if untreated immediately at birth, damages the nervous system and causes mental retardation.

phoneme The basic unit of a language's phonetic system; phonemes are the smallest sound units that affect meaning.

phonological awareness The understanding of the sounds of a language and of the properties, such as the number of sounds in a word, related to these sounds.

phonology The system of sounds that a language uses.

Piagetian theory A theory of cognitive development that sees the child as actively seeking new information and uses two basic principles of biology and biological change: organization and adaptation.

pituitary gland A so-called master gland, located at the base of the brain, that triggers the secretion of hormones by all other hormone-secreting, or endocrine, glands.

placenta A fleshy, disklike structure formed by cells from the lining of the uterus and from the *zygote* that, together with the *umbilical cord*, serves to protect and sustain the life of the growing organism.

planning The deliberate organization of a sequence of actions oriented toward achieving a goal.

plasticity The capacity of the brain, particularly in its developmental stages, to respond and adapt to input from the external environment.

popular children Children who are liked by many peers and disliked by very few.

postconventional level Kohlberg's third level of moral development, in which the child's judgments are rational and his conduct is controlled by an internalized ethical code that is relatively independent of the approval or disapproval of others.

pragmatics A set of rules that specify appropriate language for particular social contexts.

preconceptual substage The first substage of Piaget's preoperational period, during which the child's thought is characterized by the emergence of *symbolic function*, the rapid development of language, animistic thinking, and egocentricity.

preconventional level Kohlberg's first level of moral development, in which he sees the child's behavior as based on the desire to avoid punishment and gain rewards.

premoral stage Piaget's first stage of moral development, in which the child shows little concern for rules.

preoperational stage In this stage, the ability to use symbols facilitates the learning of language; this stage is also marked by semilogical reasoning, egocentricity—in which the child sees the world from her own point of view—and intuitive behavior, in which the child can solve problems using mental operations but cannot explain how she did so.

preterm A term describing a premature baby who is born before its due date and whose weight, although less than that of a full-term infant, may be appropriate to its gestational age.

primary circular reactions Behaviors focused on the infant's own body that the infant repeats and modifies because they are pleasurable and satisfying.

proactive aggression The use of force to dominate another person or to bully or threaten others.

problem solving The identification of a goal and of steps to reach that goal.

production deficiency Inability to generate and use a known memory strategies spontaneously.

productive language The production of speech.

progesterone A hormone that, in females, helps regulate the menstrual cycle and prepares the uterus to receive and nurture a fertilized egg.

propositional reasoning Logical thinking that involves evaluating a statement or series of statements based on the information in the statement alone.

prosocial behavior Behavior designed to help or benefit other people.

prosocial reasoning Thinking and making judgments about prosocial issues.

protodeclarative A gesture that an infant uses to make some sort of statement about an object.

protoimperative A gesture that either an infant or a young child may use to get someone to do something she or he wants.

proximal-distal The pattern of human physical growth wherein development starts in central areas, such as the internal organs, and proceeds to more distant areas, such as arms and legs.

psychoanalytic theory of attachment Freud's theory that babies become attached first to the mother's breast and then to the mother herself as a source of oral gratification.

psychodynamic theory In this view of development, which is derived from Freudian theory, development occurs in discrete stages and is determined largely by biologically based drives shaped by encounters with the environment and through

the interaction of the personality's three components—the id, ego, and superego.

psychometrician A psychologist who specializes in the construction and use of tests designed to measure various psychological constructs such as intelligence and various personality characteristics.

psychosocial theory Erikson's theory of development that sees children developing through a series of stages largely through accomplishing tasks that involve them in interaction with their social environment.

psychostimulant medications Drugs, such as amphetamines and caffeine, that increase alertness and attention as well as psychomotor activity.

puberty The onset of sexual maturity.

random assignment The technique by which researchers assign individuals randomly to either an *experimental* or *control* group.

range of reaction The notion that the human being's genetic makeup establishes a range of possible developmental outcomes, within which environmental forces largely determine how the person actually develops.

reactive aggression Aggressive behavior as a response to attack, threat, or frustration.

recast A technique adults use in speaking to young children in which they render a child's incomplete sentence in a more complex grammatical form.

receptive language Understanding the speech of others.

recessive The weaker of two alleles in a heterozygous combination.

reciprocal instruction A tutoring approach based on the ideas of the *zone of proximal development* and *scaffolding*.

recovery The ability to recognize a new stimulus as novel and to direct attention to it in preference to a familiar stimulus.

reflex A human's involuntary response to external stimulation.

reflex smile A smile seen in the newborn that is usually spontaneous and appears to depend on some internal stimulus rather than on something external such as another person's behavior.

rehearsal A memory strategy in which one repeats a number of times the information one wants to remember, either mentally or orally.

rejected children Children who are disliked by many peers and liked by very few.

relational aggression Damaging or destroying interpersonal relationships by such means as excluding another or gossiping about or soiling another's reputation.

relational victimization The attempt by a peer to damage or control another child's relationships with others.

relationship A continuing succession of interactions between two people that are affected by their shared past interactions and that also affect their future interactions.

reliability The degree to which a test yields consistent results over time or successive administrations.

REM sleep REM, or rapid eye movement, sleep is characterized by rapid, jerky movements of the eyes and, in adults, is often associated with dreaming.

representativeness The degree to which a sample actually possesses the characteristics of the larger population it represents.

reputational bias Children's tendency to interpret peers' behavior on the basis of past encounters with and feelings about them.

respiratory distress syndrome A condition of the newborn marked by labored breathing and a bluish discoloration of the skin or mucous membranes; can result in infant death.

reversibility The understanding that the steps of a procedure or operation can be reversed and that the original state of the object or event can be obtained.

Rh factor incompatibility A condition in which an infant's Rh-negative blood opposes its mother's Rh-positive blood and threatens fetuses in later births, when the mother's body has had time to produce antibodies that will attack fetal blood cells.

sample A group of individuals who are representative of a larger population.

scaffolding An instructional process in which the more knowledgeable partner adjusts the amount and type of support he offers to the child to fit with the child's learning needs over the course of the interaction.

schema (plural, schemas) An organized unit of knowledge that the child uses to try to understand a situation; a schema forms the basis for organizing actions to respond to the environment.

scientific method The use of measurable and replicable techniques in framing hypotheses and collecting and analyzing data to test a theory's usefulness.

script A mental representation of an event or situation of daily life, including the order in which things are expected to happen and how one should behave in that event or situation.

secondary circular reactions Behaviors focused on objects outside the infant's own body that the infant repeatedly engages in because they are pleasurable and satisfying.

secondary reinforcer A person or other stimulus that acquires reinforcing properties by virtue of repeated association with a primary reinforcer.

secular trend A shift in the normative pattern of a characteristic, such as height, that occurs over a historical time period, such as a decade or century.

secure attachment A kind of attachment displayed by babies who are secure enough to explore novel environments, who are minimally disturbed by brief separations from their mothers, and who are quickly comforted by their mothers when they return.

secure base According to Ainsworth, a caregiver to whom an infant has formed an attachment and whom the child uses as a base from which to explore and as a safe haven in times of stress.

selective attention A strategy in which one focuses on some features of the environment and ignores others.

self-control phase According to Kopp, the second phase in learning self-regulation, when the child becomes able to comply with caregiver expectations in the absence of the caregiver.

self-disclosure The honest sharing of information of a very personal nature, often with a focus on problem solving; a central means by which adolescents develop friendships.

self-regulation The child's ability to control behavior on her own without reminders from others.

self-regulation phase According to Kopp, the third phase in learning self-regulation, when children become able to use strategies and plans to direct their own behavior and to delay gratification.

self-report Information that people provide about themselves, either in a direct interview or in some written form, such as a questionnaire.

self-socialization The child's spontaneous adoption of gender-appropriate behavior.

semantic memory All the world knowledge and facts a person possesses.

semantics The study of word meanings and word combinations, as in phrases, clauses, and sentences.

sensation The detection of stimuli by the sensory receptors.

sensitive care Consistent and responsive caregiving that begins by allowing an infant to play a role in determining when feeding will begin and end and at what pace it will proceed.

sensorimotor stage Piaget's first stage of cognitive development, during which children change from basic reflexive behavior to the beginnings of symbolic thought and goal-directed behaviors.

sensory register The mental processing unit that takes information from the environment and stores it in original form for brief periods of time.

separation protest An infant's distress reaction to being separated from his or her mother, which typically peaks at about 15 months of age.

sequential method A research method that combines features of both the *cross-sectional* and the *longitudinal methods*.

sex chromosomes In both males and females, the 23rd pair of chromosomes, which determine the individual's sex and are responsible for sex-related characteristics; in females, this pair normally comprises two X chromosomes, in males an X and a Y chromosome.

sexual abuse Inappropriate sexual activity between an adult and a child for the perpetrator's pleasure or benefit; the abuse may be direct (sexual contact of any type) or indirect (exposing a child to pornography or to the live exhibition of body parts or sexual acts).

sexual preferences The preference for same or opposite gender sexual partners.

shape constancy The ability to perceive an object's shape as constant despite changes in its orientation and the angle from which one views it.

shared environment A set of conditions or experiences shared by children raised in the same family; a parameter commonly examined in studies of individual differences.

short-term, or working, memory The mental processing unit in which information is stored temporarily; the "work space" of the mind, where a decision is made to discard information, work on it, or transfer it to permanent storage in *long-term memory*.

sickle-cell anemia A disorder, caused by a recessive gene, in which the red blood cells become distorted when low in oxygen, causing fatigue, shortness of breath, and severe pain and posing a threat to life from blockage of crucial blood vessels.

size constancy The tendency to perceive an object as constant in size regardless of changes in its distance from the viewer and in the image it casts on the retinas of the eyes.

small for date A term describing a premature baby who may be born close to its due date but who weighs significantly less than would be appropriate to its gestational age.

social comparison The process by which we evaluate our own abilities, values, and other qualities by comparing ourselves with others, usually our peers.

social-convention rules Socially based rules about everyday conduct.

socialization The process by which parents and others ensure that a child's standards of behavior, attitudes, skills, and motives conform closely to those deemed appropriate to her role in society.

socially unskilled Being unskilled at solving interpersonal problems.

social referencing The process of "reading" emotional cues in others to help determine how to act in an uncertain situation.

sociocultural theory A theory of development, proposed by Lev Vygotsky, that sees development as emerging from children's interactions with more skilled people and the institutions and tools provided by their culture.

sociometric technique A procedure for determining children's status within their peer group; each child in the group either nominates others whom she likes best and least or rates each child in the group for desirability as a companion.

specific factors (*s*) Factors unique to particular cognitive tasks.

speech acts One- or two-word utterances that clearly refer to situations or to sequences of events.

sperm The male germ cell.

spermarche In males, the first ejaculation of semen-containing ejaculate.

stages of development Comprehensive, qualitative changes over time in the way a child thinks.

Stanford-Binet Test The modern version of the first major intelligence test; emphasizes verbal and mathematical skills.

standardization The process by which test constructors ensure that testing procedures, instructions, and scoring are identical, or as nearly so as possible, on every testing occasion.

status offense Illegal behavior in an underage offender.

stereoscopic vision The sense of a third spatial dimension, that of depth, produced by the brain's fusion of the separate images contributed by each eye, each of which reflects the stimulus from a slightly different angle.

stereotype threat Being at risk of confirming a negative stereotype

about the group to which one belongs.

Strange Situation A testing scenario in which mother and child are separated and reunited several times; enables investigators to assess the nature and quality of a mother-infant attachment relationship.

stranger distress A fear of strangers that typically emerges in infants around the age of 9 months.

strategies Conscious cognitive or behavioral activities used to enhance mental performance.

structural-organismic perspectives Theoretical approaches that describe psychological structures and processes that undergo qualitative or stagelike changes over the course of development.

structured observation A form of observation in which researchers structure a situation so that behaviors they wish to study are more likely to occur.

substance abuse The excessive use of legal or illegal drugs in such a way as to interfere seriously with one or more important areas of functioning in life: work, intimacy with another, or general interpersonal and social relationships.

successful intelligence Ability to fit into, change, and choose environments that best fulfill one's own needs and desires as well as the demands of one's society and culture. Includes analytical, creative, and practical abilities.

sudden infant death syndrome (SIDS) The sudden, unexplained death of an infant while sleeping; also called *crib death*.

superego In Freudian theory, the personality component that is the repository of the child's internalization of parental or societal values, morals, and roles.

symbolic function The ability to use symbols, such as images, words, and gestures, to represent objects and events in the world.

symbolic thought The use of mental images and concepts to represent people, objects, and events.

synapse A specialized site of intercellular communication where information is exchanged between nerve cells, usually by means of a chemical *neurotransmitter*.

synaptic pruning The brain's disposal of the axons and dendrites of a neuron that is not often stimulated.

synaptogenesis The forming of synapses.

syntax The part of grammar that prescribes how words may combine into phrases, clauses, and sentences.

syphilis A sexually transmitted bacterial disease that can usually be treated with antibiotics, but if untreated in the pregnant woman, can cause miscarriage or blindness, mental retardation, or other physical abnormalities in her baby.

tacit knowledge Implicit knowledge that is shared by many people and that guides behavior.

telegraphic speech Two-word utterances that include only the words essential to convey the speaker's intent.

temperament The individual's typical mode of response to the environment, including such things as activity level, emotional intensity, and attention span; used particularly to describe infants' and children's behavior.

teratogen An environmental agent, such as a drug, medication, dietary imbalance, or polluting substance, that may cause developmental deviations in a growing human organism; most threatening in the embryonic stage but capable of causing abnormalities in the fetal stage as well.

tertiary circular reactions Behaviors in which infants experiment with the properties of external objects and try to learn how objects respond to various actions.

test norms Values, or sets of values, that describe the typical test performance of a specific group of people.

testosterone A hormone that, in males, is responsible for the development of primary and secondary sex characteristics and is essential for the production of sperm.

thalidomide A drug once prescribed to relieve morning sickness in pregnant women but discontinued when found to cause serious fetal malformations. Current controversy surrounds its possible use in treating symptoms of such diseases as

AIDS, cancer, and Hansen's disease (leprosy).

theory of mind Understanding of the mind and how it works.

theory of multiple intelligences Gardner's multifactorial theory that proposes eight distinct types of intelligence.

time-out Removing children from a situation or context in which they are acting inappropriately until they are able and ready to act appropriately.

toxoplasmosis A parasitic disease acquired by eating undercooked meat or by contact with feces, as in handling cat litter.

traditional nuclear family The traditional family form, composed of two parents and one or more children, in which the father is the breadwinner and the mother the homemaker.

transitive inference The mental arrangement of things along a quantitative dimension.

triarchic theory of intelligence A theory that proposes three major components of intelligence: information-processing skills, experience with a task, and ability to adapt to the demands of a context.

Turner syndrome A form of chromosome abnormality found in females in which secondary sex characteristics develop only if female hormones are administered, and abnormal formation of internal reproductive organs causes permanent sterility.

two-generation program A program of early cognitive intervention that extends help to parents as well as to their children.

ultrasound A technique that uses sound waves to visualize deep body structures; commonly used to reveal the size and structure of a developing fetus. Also called ultrasonography.

umbilical cord A tube that contains blood vessels connecting the growing organism and its mother by way of the *placenta*; it carries oxygen and nutrients to the growing infant and removes carbon dioxide and waste products.

undercontrolled disorders A group of psychological disturbances in

which a child appears to lack self-control and to act-out in a variety of ways, through such behaviors as noncompliance, disobedience, and aggression.

underextension The use, by a young child, of a single word in a restricted and individualistic way.

uninvolved parenting Parenting that is indifferent and neglectful and in which parents focus on their own needs rather than their children's needs.

utilization deficiency Inability to use a known memory strategy or to benefit from the use of such a memory strategy.

validity The extent to which a test actually measures what it claims to measure.

visual acuity Sharpness of vision; the clarity with which fine details can be detected.

visual cliff An apparatus that tests an infant's depth perception by using patterned materials and an elevated, clear glass platform to make it appear that one side of the platform is several feet lower than the other.

visual preference method A method of studying infants' abilities to distinguish one stimulus from another in which researchers measure and compare the amounts of time babies spend attending to different stimuli.

Wechsler Intelligence Scales Three intelligence tests for preschool children, school-age children, and adults that yield separate scores for verbal and performance IQ as well as a combined IQ score.

world knowledge What a child has learned from experience and knows about the world in general.

X-linked genes Genes that are carried on the X chromosome and that, in males, may have no analogous genes on the Y chromosome.

zone of proximal development (ZPD) The region of sensitivity for learning characterized by the difference between the developmental level of which a child is capable when working alone and the level she is capable of reaching with the aid of a more skilled partner.

zygote The developing organism from the time sperm and egg unite to about the second week of gestation; the period of the zygote comprises the implantation of the fertilized egg in the wall of the uterus.

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