### LIFELONG CREATIVITY

An Unending Quest

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Tata McGraw-Hill Publishing Company Limited NEW DELHI

McGraw-Hill Offices

New Delhi New York St Louis San Francisco Auckland Bogotá Caracas Lisbon London Madrid Mexico City Milan Montreal San Juan Singapore Sydney Tokyo Toronto

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This edition can be exported from India only by the publishers, Tata McGraw-Hill Publishing Company Limited

ISBN 0-07-049959-4

Published by Tata McGraw-Hill Publishing Company Limited,
7 West Patel Nagar, New Delhi 110 008, Typeset at LeoCap Expressions,
B 302, Rishi Apartments, Alaknanda, New Delhi 110019, and Printed at
Sai Printo Pack, Y-56, Phase II, Okhla Industrial Area, New Delhi

Cover: Mesmerizers, Bangalore

Code: RZXCRDRDDLCZY

То

*Kalini* My daughter, friend, and mentor

# Preface

This book has grown out of my earlier book, *Fourth Eye: Excellence through Creativity* published by A H Wheeler. It's last edition was published in 1988. When I set out to revise it, I found so many new ideas, insights, and research findings that I abandoned the idea of revising it and instead decided on writing virtually a new book. While *Fourth Eye* covered both individual level creativity and management creativity, I decided to write two companion volumes–*Lifelong Creativity: The Unending Quest* dealing with individual creativity, and *Corporate Creativity: The Winning Edge* covering management creativity.

Creativity is an elixir. Every time you visit it, you return bubbling with new ideas. *Fourth Eye* was a sort of programmed text on creativity. *Lifelong Creativity* is more contemplative, more exploratory, and more pathbreaking. It enquires into the roots of creativity—what is it about our biology, the way our minds work, the way society is, and our spirituality that makes our creativity possible? What different forms does our creativity take? What prejudices and misconceptions cloud our perception of creativity? What blocks our creativity? Is lifelong creativity possible? And, of course, the million-dollar question—how can we enhance our creativity and sustain it throughout our lifetime?

To find the answers, I have scanned global research as well as my own work as a creativity trainer and researcher. Of course, the answers are not perfect. But they are usable. I have retained the self-development features of *Fourth Eye*—the chapter-end quizzes and mental gyms; the instruments for self-evaluation that can point the way ahead; and the bibliography of popular and scholarly books on creativity for those who wish to probe further. I have also tried to keep the book free of jargon without turning it into one of those 'seven steps to creative bliss' books.

This book is aimed at thinking people who are seriously interested in the creativity phenomenon and are excited about raising their personal creativity to newer levels.

For me, writing the book was a series of peak experiences. I hope the reader too will have the highs reading the book.

**PRADIP N KHANDWALLA** 

# Acknowledgements



A number of persons have graciously contributed to this volume. Ms Shyama Sarabhai permitted the use of a captivating painting of hers on the cover of the book. Ms Arshi Zahid provided several evocative drawings of hers, that she had created out of letters and words, for use in the book. My wife Anjali and my daughter Kalini read several of the chapters, and their comments materially altered both the content and the colour of the text. Ms Uma Baskaran did a diligent job, as usual, of typing out the manuscript and incorporating, without flinching, the innumerable changes I kept on making in the text.

Dr N Subrahmanyam and Mr R Chandra Sekhar of Tata McGraw-Hill were very encouraging. I am also indebted to the copy-editors for their care and helpful suggestions. In some of the chapters, I have drawn considerable materials from my earlier book *Fourth Eye: Excellence through Creativity*, second edition, published by A H Wheeler and Company.

**PRADIP N KHANDWALLA** 

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# PART 1

# The Creativity Phenomenon

- The Realm of Creativity
- Can Creativity be Enhanced?
- Puzzles of Creativity
- The Body and the Mind as Roots of Human Creativity
- Spiritual and Social Roots of Creativity
- Essence, Elaborative, and Expressive Creativities
- Existential, Entrepreneurial, and Empowerment Creativities
- Quality of Creativity



# 1

## The Realm of Creativity



We are an imperfect species. Restless and constantly uncomfortable, too. Look at the coelacanth and the crocodile-practically unchanged for 400 million years, more or less. And here we are, a fledgling hominid species, barely a hundred thousand years old, and we have transformed not only ourselves but the world as well. How? By inventing language and the means of communication; the family; the community; the enterprise; the state; religion; science and technology; medicine and education; entertainment; arts and literature; and weapons. Caught short by our inadequacies and stretched taut by our terrific-and terrible-yen for improvements and breakthroughs, we have discovered the magic called creativity. And so, as a species, we have been on a roll.

Today especially, we need creativity for grave practical reasons. We have created a competitive, dynamic world in which the well-being and growth of nations, organizations, and even individuals may increasingly depend upon how creative and innovative they are. Some nations are so far behind the few, highly developed nations that they can never hope to catch-up in living standards simply by investing a lot of money. When a country's manufacturing

The art of creating is older than the art of killing Andrey Voznesensky

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#### Lifelong Creativity

productivity, like India's, is a small fraction of the world's industrialized countries, high levels of creativity and innovation are indispensable for catching-up. The world's economies have been substantially integrated through lowered entry barriers, and the Information Technology (IT) and telecom revolutions. All over the world, hyper-competition has begun to rage. How can organizations survive in this maelstrom unless they keep ahead of their rivals through innovating new products, services, and technologies and even management? What is true of nations and organizations is, to an extent, true of individuals as well. A knowledge society is emerging all over the world. But it is not just a knowledge society. It is also a society characterized by short shelf life of knowledge in which established knowledge bases get obsolete fairly quickly. The name of the game for individuals, too, is quick adaptation to new knowledge bases and innovating niches within them.

But creativity is not just transformation and survival. It is also exhilaration that stretches us physically, mentally, emotionally, and spiritually. We light up when we invent a gadget or create a metaphor or stumble upon a new formula or recipe or avenue of growth. And that radiance makes us see far and deep within us and uncover new strengths, potentialities and intentions.

This book is not just about creativity. It is about helping the so-called 'ordinary' people discover their extraordinary capabilities and become lifelong creators. Why? Because lifelong creativity yields, again and again, peaks of exhilaration and contributions to the quality of one's life as well as that of others. It also brings one's ventures to successful, impact-making fruition.

So, let us go then, you and I, to explore far into the realm of creativity.

#### WHAT IS CREATIVITY?

One way to understand creativity is to contrast it with productivity. One pulp fiction writer may produce 100 novels, all with the theme of a love quadrangle-two men chasing a woman and two women chasing the same man, and at the end one triumphant union and two distressed egos. Against that Arundhati Roy may produce just one novel but one of a kind that wins her the Booker Prize. In productivity, the identity of the things created is so highly shared that it is sometimes quite difficult to tell them apart. But not so in creativity. A creative poet writes unique poems; a creative architect designs unique homes; a creative scientist develops unique formulae; a creative cook creates unique recipes; and a creative mentor creates unique learning situations.

But there is more to creativity than uniqueness. If you splash paint on 20 canvasses, you will get 20 unique smudges but no creativity is involved (the Dadaists may disagree). For something to be creative, it must at the least be novel *and* appropriate to the context. Don MacKinnon has explained: "Mere novelty of a product does not, however, justify its being called creative ... the

product must be adaptive to reality. In other words, it must serve to solve a problem, fit the needs of a given situation, accomplish some recognizable goal."<sup>1</sup>

Thus, a novel hypothesis that explains evolution would be a creative act. A story that successfully blends magic and realism would also qualify as creative. The effort must result in something that is both fresh and usable. This is not easy because two different logics are needed—the logic of surprise and the logic of appropriateness. The creative person needs to course in the heavens and also swim with the tide.

Such a view of creativity raises awkward questions. Who decides whether something is novel or not? Who decides whether it is appropriate or not? What may be novel to the layman may not be novel to the expert, and what may seem very appropriate to one person may seem pretty irrelevant or silly to another. What may seem novel in one period may seem quite boringly familiar in the other, and what may seem very appropriate in one context may seem quite out of place in another. There are creativity experts who leave it to time to decide whether something is creative or not,<sup>2</sup> and by that standard 'classics' like the plays of Shakespeare are creativity experts who would rely on the judgement of experts and the knowledgeable,<sup>3</sup> but would have no answer if the experts violently disagree, as they often do about works of art, literature, or even science, especially social science.

Then there are experts who have asserted that creativity is not a black or white thing; there are shades of grey. In other words, creativity can range from just a dash of novelty to a truly profound invention. One of them, Ainsworth-Land, proposed four levels of creativity<sup>4</sup>. (1) at the base, one that is merely an elaboration of an idea; (2) higher, an effort that results in an improvement; (3) higher still, a superior quality synthesis of previously unrelated ideas or perspectives or themes; and (4) the highest, a genuine transformation that is revolutionary in its impact. Another expert, Irving Taylor, has espoused an even more elaborate differentiation, ranging from a spontaneous expression such as that of a child painter, an improved technique, an invention, and so forth rising to what Taylor calls emergentive creativity involving new and revolutionary laws or principles.<sup>5</sup>

For greater insight into what creativity is, let us draw upon two sources of knowledge–our experience of creativity and the experts' views of creativity.

We tend to know things in two ways. One way is to experience a thing and the other way is to peer at it and identify its characteristic traits. Both ways have their uses. Experiencing something involves emotion, intuition, and imagination; examining it for identification and study involves logic, relevance, and utility.

In my creativity training workshops, I often try to find out how the participants experience creativity. I ask them to give metaphors for creativity. What a rich haul I get! Metaphors tumble forth, hesitantly at first, then in a torrent. "Lightning", "torch in a cavern", and "spark" hint at the

Lifelong Creativity

electric quality of the creative inspiration. "Flood", "cloudburst", and "supernova" capture the outflow of energy during the creative effort. "Explorer", and "pathfinder" highlight the pioneering drive of the creator. "Kaleidoscope" points to the many facets of the versatile creator. "Sweet and sour food", "agony and ecstasy", "coral reef", and "snakes and ladders" capture the pain, the peak experiences, the failures, and the successes of the creative adventure. "Waste paper basket" alludes to the mortality of bright ideas and "old wine in new bottle" to the packaging skills of pseudo-creators. "Elixir" and "whisky" signal the intoxication of creation. "Bed tea" and "night cap" point to the tendency of bright ideas to pop out during semi-somnolent states. "Digestion" suggests the transformation of facts, feelings, and ideas during the phase of incubation. "Fishing" refers to the need to be patient in seeking creative ideas; "pollination", to their cross-fertilization. "Embroidery" and "origami" speak of creation as designing. "Child at play", and "the adivasi (aborigine) in modern man" hint at the childlike openness needed to be creative. "Sexual union", "fusion", "marriage", and "melting pot" underline what Koestler called bisociation-the uniting of two previously unrelated frames of reference to give birth to something fresh and novel.<sup>6</sup> Then there are "party" and "pun", and "God's hand", "telescope", "escape from jail", "butterfly emerging from the chrysalis", and "tandava<sup>\*</sup>" each celebrating some aspect or the other of creativity.

Now let us turn to definitions of creativity by experts. There are scores of them. Over 50 were reported by 1960, and many more must have been attempted since.<sup>7</sup> Here are a few.

- The ability or quality displayed when solving hitherto unsolved problems, when developing novel solutions to problems others have solved differently, or when developing original and novel (at least to the originator) products.<sup>8</sup>
- The creative act is an outcome of the interaction between novel insight yielding primary process thinking and moulding and contextualizing secondary process thinking.<sup>9</sup>
- Creativity is a dynamic tension between several opposing forces-freedom versus discipline, speculation versus safekeeping, divergence versus convergence, relaxation versus alertness, feeling versus thinking, learning versus problem solving, ideating versus evaluating, and experiencing versus abstract thinking.<sup>10</sup>
- A creative contribution is something that is (1) relatively original and (2) high in quality vis-à-vis some purpose.<sup>11</sup>
- Creative process is the forming of associative elements into new combinations, which either meet specified requirements or are in some way useful. The more remote the elements, the greater the creativity.<sup>12</sup>

These definitions, as also others, emphasize different facets of creativity. Some emphasize the outputs of creative effort, and they view creativity as the discovery/innovation of something that

<sup>\*</sup> Lord Shiva's cosmic dance of destruction.

is novel and also useful or relevant or economical or elegant or valuable.<sup>13</sup> Thus, a pen that can adjust its size to the size of the hand would be considered creative.

Some others have stressed the creative process.<sup>14</sup> In this view, creativity is goal-oriented exploratory thinking, the seeking of relationships between previously unrelated concepts or frames of reference, of imagining possibilities, of exploring the under-known, and cycles of exploratory and analytical thinking. The outcome of this effort may or may not be creative, but the effort reveals the characteristics of the creative process–wide search, leaps of imagination, incubation, sometimes strikingly fresh insights. Thus it is that we say that the sciences and the arts are generally more creative pursuits than, say, factory work or vocational training, or that research and development is a more creative activity than accounting and control. That is, problem solving in the sciences, the arts, or in R&D generally exhibits greater exploratory, imaginative 'divergent thinking' than problem solving relating to factory work, vocational training, or accounting and control. (This does not, of course, mean that one cannot be creative in factory work or in accounting; only that, because of the routine nature of the work, the individual is not *required* to be imaginative.)

Still others identify creativity with certain *states* of the *being*. For example, Abraham Maslow, the guru of humanist psychology, has identified creativity with openness in expressing feelings, receptivity to ideas, concern for others, desire to grow as a person and acutalize one's potential, and so forth.<sup>15</sup> Other psychologists have compared creative and non-creative persons from the same profession.<sup>16</sup> They have identified a number of personality traits and abilities that distinguish creative from non-creative persons, like the greater love of complexity of the creatives, their more bizarre fantasy life but simultaneously a high degree of contact with reality, and their greater independence of judgement. The ability to come up with many, varied, and uncommon ideas or solutions also seems to distinguish creative from non-creative persons as also their ability to notice anomalies, issues, paradoxes, etc.<sup>17</sup>

Each one of these views of creativity is flawed. If one judges creativity only in terms of the novelty and usefulness or elegance of a *product*, one may sometimes find that this creative product may have been discovered or produced either by accident or by a non-creative process. Today, innovations are increasingly institutionalized. For example, many researchers discover something or the other simply by taking a problem area and by applying the scientific method to it. Indeed, Maslow has contemptuously disposed off universities and scientific establishments as havens of the mediocre. If one judges creativity by the creative *process* instead of the creative product, the dreamer would be the champion creative, for the extent of imagination and divergent thinking, playful, 'if– suppose' combinations, the relating of remote ideas, and so forth that characterize the creative process are at their flood tide during dreaming. If creativity is to be judged in terms of the characteristics of the creative person, such as curiosity, receptivity, idea

flow, lack of inhibitions, etc. the child would outrank the Einsteins, Tagores, and Picassos of the world.

I suspect creativity has to do with the employment of a playfully exploratory rather than a mechanical process of problem solving, by a person who is open and curious and imaginative rather than by a person who is inhibited and conventional, to find solutions or designs that are novel (and yet appropriate in the context) rather than merely run-of-the-mill.

#### IS CREATIVITY LATERAL THINKING?

In recent years, Edward de Bono has popularized a mode of thinking that he calls 'lateral thinking' (see box on *PO* and de Bono's '*Lateral Thinking*').<sup>18</sup> This is 'out-of-the box', 'non-linear' thinking to be differentiated from logical, extrapolative thinking. Is creativity nothing but lateral thinking?

Creativity includes lateral thinking but goes far beyond it. Creativity is not just thinking; it is also creative intelligence, personality, motivation, expertise, process, context and product. We shall discuss these facets in later chapters. Let us first discuss the thinking aspect of creativity.

#### PO and de Bono's 'Lateral Thinking'

Edward de Bono has suggested the use of what he calls PO (for provocative operation?) for 'lateral thinking'. His basic argument is that people often fall into a problem-solving rut. That is, they tend to solve problems using 'old think,' consisting of habitual, logical, orderly, evaluative, or ideological ways of dealing with problems. But in tough problems, these do not get us very far. PO consists of mechanisms to derail habitual approaches and mental sets, such as an irrelevance, a joke, an inversion, the questioning of an assumption, the exploration of an impossibility, the seeking of an opportunity in a crisis, and so forth. For example, if fire breaks out in one of the oil tanks of a tanker at sea, how does one control the fire from spreading? The usual solution would be to try and race against fire by pumping out the oil as fast as possible from the tank and adjoining tanks. More likely than not, this would be a losing battle. Suppose instead, the tank is quickly filled to capacity and shut tight so that the explosive mixture of air and oil is not allowed to form?

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#### **CREATIVE CEREBRATION**

#### **Convergent Versus Divergent Thinking**

When our daughter Kalini was little, Kalini and I used to play a game. We alternatively asked each other the opposite of something. For example, she would ask me, "What is the opposite of cold?" I would say "hot"; and then I would ask her, "What is the opposite of white?" She would say "black", and so on. After a while, however, we would give a twist to the game. She might ask me, "What is the opposite of red?" And I might ask her, "What is the opposite of a cupboard?" We struggled with these questions. She told me, for example, that the opposite of a cupboard was a *chandla*<sup>\*</sup>. "Why?" I asked her. "Well, it contains nothing; it is round whereas a cupboard is rectangular; it is red while a cupboard is brown or blue; it is small but a cupboard is large; it is soft and light and a cupboard is hard and heavy", and so forth.

Obviously, there is no single right answer to the opposite of a cupboard, and getting an answer requires considerable quest, sometimes even the invention of new rules of the game. For example, when she asked me the opposite of red, I had to think of what red stands for, and then find something that was not the things that red stands for. Red stands for Mars and war, for blood, for sunset, for rose, and of course, many other things. My answer was marble, but I am sure other people may come up with different answers. This is what psychologists such as J.P. Guilford have called 'divergent thinking.'<sup>19</sup>

We may distinguish between two basic types of thinking activity. One may be called convergent and the other, divergent. If I were to ask the question, "What is the city 300 miles south-west of Ahmedabad?", a good student is apt to say Mumbai, and we are likely to give him a pat on his back. Similarly, if I say what is 'x' equal to in the equation  $x^2$ -36=0, a good student is likely to say  $\pm$  6. Again, we are likely to dispense a smile of approval. In these examples, the common stock of our examinations, the problems are such that there is only one right answer or at best a few right answers, and these answers can easily be discriminated from many wrong ones. Also, given the problem, any one knowing the basic logical, mathematical, or memory operations can reach the right answer. This permits the 'good' student to demonstrate his or her superiority over the lesser denizens of the classroom, and the teacher to enjoy a glow of satisfaction at the student's prowess.

But there is another type of thinking elicited by a class of problems for which there is no known good or correct solution, and indeed, the mental operations by which one can reach a good answer are sometimes not clear at all.

<sup>\*</sup> An auspicious orb-like vermilion mark on the forehead of married Hindu women, also called bindi.

Let me give some examples of problems involving divergent thinking.

- What would happen if animals could be genetically crossed with plants?
- How many uses are there of a teaspoon?
- What laws of physics might apply in a universe made of anti-matter?
- What would have happened if Vasco da Gama had not discovered the sea route to India?
- What poem could be written with the title 'Future of the Past' ?
- What are the implications of Zen Buddhism for physics?

It is obvious that to be able to tackle the foregoing problems the mind would have to surf into uncharted areas. The person would have to adopt new frames of reference, draw heavily on imagination and intuition, and seek previously unsuspected relationships. In other words, the person would have to engage in a good deal of divergent thinking.

As Guilford has noted, "The unique feature of divergent production is that a variety of responses is produced. The product is not completely determined by the given information...Divergent thinking...comes into play whenever there is trial-and-error thinking..."<sup>20</sup> Further, "in divergent thinking operations we think in different directions, sometimes searching, sometimes seeking variety. In convergent thinking, the information leads to one right answer or to a recognized best or conventional answer."<sup>21</sup>

While divergent thinking is undoubtedly the distinguishing characteristic of creative thinking, there is an important place for convergent thinking, too. In grasping what an unclear problem is, a good deal of logical, convergent thinking is needed. Also, once the divergent thinker comes up with some fresh solutions, a good deal of convergent thinking ability must come into play. Categorization, logical thinking, analysis, comparing, evaluation, and so forth—the stock-in-trade of convergent thinking—become critical in this phase of problem solving for assessing the alternative solutions. Indeed, quite often, creative thinking consists of alternating phases of imaginative (divergent) and rational (convergent) thinking.<sup>22</sup>

#### **Creative Intelligence**

While divergent thinking is similar to de Bono's lateral thinking, we need to understand better what capabilities are needed to engage in productive divergent thinking. Several capabilities identified by researchers constitute creative intelligence.<sup>23</sup>

#### I. Fluency

Fluency measures a person's ability to come up with a number of solutions to a given problem. For example, if I ask a group of persons to list the number of uses of bricks, some might come up with five uses, others with 15 or 20. Those that come up with a large number of uses would be called ideationally fluent persons. Ideationally fluent persons tend to come up with a greater variety of solutions as well as with a larger number of unusual solutions than persons that are ideationally not fluent.<sup>24</sup>

#### 2. Flexibility

The ability to provide a large *variety* of solutions, to respond to a problem from a variety of viewpoints, and to use a variety of approaches in problem solving is another important ability. It is called flexibility. In the brick example, one person may list several uses of bricks, but all these uses may be connected with its use as a construction material–build houses, build bridges, build wells, build walls, etc. Another person may list a large *variety* of uses such as bricks as weapons, as stepping stones in mud, as doorsteps, as engraving material, as support for shelves, etc.

#### 3. Originality

The third creative ability is originality, or the ability to come up with unusual but appropriate responses. For bricks, their use as hiding places for jewellery, or as dumb-bells, or as substitutes for pillows by placing them under the mattress, may be considered unusual and therefore, original responses. A related ability is the ability to come up with novel relationships between ideas or frames of reference. This is the sense in which Koestler understands creativity.<sup>25</sup> It is the faculty that helps an Edison leap to the realization that what you need to turn electricity into light is not a good conductor of electricity as his contemporaries thought, but a bad conductor–resulting in a new relationship between current, impedance, and incandescence. It is the faculty that helps one see the possibilities for perspective painting by measuring the angles subtended in the eye by objects. And finally, it is the faculty that helps a poet to see neckties as the tethers of civilization, or rivers as the arteries of God.

#### 4. Problem Sensitivity

A fourth ability is to notice the unexplained, the unsatisfactory, or the incongruent—in other words, the ability to sense problems and issues that may be unclear or camouflaged. Scientists often dismiss data inconsistent with their pet theories as 'noise'. It is the inquisitive scientist, curious about 'noise', that sometimes makes remarkable discoveries. Alexander Fleming, the pathbreaker to penicillin, is a case in point. Many scientists had observed that a fungus forming in a bio-chemical culture inhibits the growth of bacteria. But they failed to grasp the significance of this 'noise' in their experiments. It was Fleming who wondered about this and saw the significance of this for treating infections.

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#### 5. Guessing Causes and Consequences

A fifth ability is the ability to go to the roots of a phenomenon by unravelling its causes, and, equally, to visualize its consequences. This, of course, is a vital ingredient of scientific creativity. But I suspect it may be equally important in artistic creativity, where the ability to discern the mental associations of an object, and its potential as a metaphor in a work of art may be vital...to see, for example, modern life as a spiritual waste land, as in Eliot's *The Waste Land*. Or, since death reminds us of tears, and tears of dewdrops, to use dew to convey pain at the death of a dewy child as in the following lovely haiku by Kabayashi Issa.

Dew evaporates And all our world is dew...so dear, So fresh, so fleeting

#### 6. Elaboration

The ability to elaborate on a theme has also been recognized as a significant creative ability. It is the difference between a legend and Shakespeare's dramatic version of it, or between an insight that capitalist economies get stuck with recessions and the full-fledged Keynesian general theory of economic equilibrium, or between the idea that man has considerable creative potential and a full-fledged training programme for increasing creativity, or between the notes of a *raga* and its elaboration in the phase called *alaap*. The ability to elaborate is indispensable in putting a creative idea to work.

#### 7. Problem Restructuring

Another ability of considerable importance is the ability to go behind the surface features of a problem, and define it in an interesting way. A group of psychologists called Gestalt psychologists have held it to be mainly responsible for producing original insights.<sup>26</sup> Consider the problem faced by an ambulance, blocked on a long and narrow bridge by a flock of sheep. So long as one defines the problem as how to get the ambulance to overtake the sheep, there would be no really effective solution. It is only when one defines the problem as one of getting the ambulance ahead of the sheep that a solution at once dawns. For a small tip, the flock can be turned around and driven past the stationary ambulance.

Obviously, these abilities-fluency, flexibility, originality, problem sensitivity, the ability to grasp the causes and visualise the consequences, the ability to elaborate, the ability to restructure problems—are not generally found in equal measure in the same individual. The individual who can ideate fluently may not be very original, and vice versa. It is, therefore, inappropriate to categorize a person as creative or uncreative without specifying the dimensions on which he/she has high ability and the ones on which the abilities are more limited. If we are comparing two individuals, we should be very careful before we brand one person as less creative than the other.

The chances are that the former may well be superior in at least one of the creativity-related abilities.

#### ARE HIGHLY INTELLIGENT PERSONS CREATIVE?

In the 20<sup>th</sup> century, Intelligence Quotient (IQ) gained huge currency as a measure of human intelligence. People began to think that high IQ denoted 'genius', and even some scholars seemed to take such a view.<sup>27</sup> IQ or its equivalents were widely used as evaluation and selection criteria, including in the US Army and in the British schooling system. They are widely used in the education and corporate sectors even today. Does high IQ imply high creativity? Let us do a 'test' to appreciate the differences.

Notice that possible solutions are much fewer in the three IQ items, 1, 3, and 5. To solve them, mostly logic and vocabulary rather than imagination are required. Solutions, once found, fit the problems rather snugly. In the divergent thinking items, a number of other mental capabilities get

	'TEST'		
١.	Find the word that does not fit with the rest.		
2	AMBUMI DNOONL COWSOM ATR		
۷.	Law Chair Bangle Sword		
3.	Write the three-letter word that means the same as the words outside the brackets.		
PROHIBIT ( ) DRINKING PLACE			
4.	4. Complete the following sentence humorously.		
	One moonlit night, while strolling in a garden,		
		L	

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•	Find	the missing	g numbe	er.
	2	9	0	8
	4	10	5	- 4
	3	5	2	2
	3	14	3	

6. Give striking alternative titles to World War II.

Items I, 3, and 5 are typical IQ items while 2, 4, and 6 are fairly typical tests of divergent thinking.

exercised, such as associative thinking (as in item 2), wide search (as in item 4), and associative thinking as well as an enormous degree of compression of thought (required in item 6) that must, however, be expressed aesthetically. Besides, a number of solutions can be conceived for each of these items. With that, there is no certainty at all that the solutions are the best possible or even good. As is obvious, the degree of convergent thinking needed is much higher for the IQ problems than for the divergent thinking problems, while the degree of divergent thinking needed is much higher for tackling 'creativity' as compared to the IQ problems. They represent quite distinctive sets of abilities, and indeed, much research suggests that those who are high IQ scorers are not necessarily creative and vice versa.<sup>28</sup> Yes, we do need some base level IQ to refine a creative effort through logic and analysis. But we do not need to have an IQ of 140 and be a member of MENSA to be creative.

Let me share with you a fascinating study I read many years ago that kindled my interest in creativity. This was a piece of research by two psychologists, Getzels and Jackson.<sup>29</sup> They studied two contrasting groups of bright children in a high-brow Chicago school. One group was higher on IQ but relatively lower on creativity while the other was higher on creativity but relatively lower on IQ. The fascinating finding was that those with high IQs were more conformist in a special sense. In their responses to problems, they were more bound by a stimulus and by the constraints in a problem situation. The high creatives did not find the 'givens' as binding, and as a consequence, they often were more playful and exploratory in their responses. For example, when asked to paint a picture on a white drawing paper, a high creative did nothing except give a title to the blank page, and the title was 'The School Yard during a Snowstorm.' When asked to indicate careers they planned to pursue, the high IQs commonly listed the typical American middle-class, high-status professions such as medicine, law, education, etc. There was much

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greater variety in the career choices of the high creatives, and many of them preferred quite off-beat careers such as adventurer, inventor, writer, etc. As Getzels and Jackson put it, "In effect the high IQ is saying, 'I know what makes for success and what teachers like, and I want these qualities too;' the high creative is saying, 'I know as well as the high IQ what makes for conventional success and what teachers like, but these are not necessarily the qualities I want for myself."<sup>30</sup> The high IQs were apparently more risk aversive, and gave more or less safe answers. The high creatives were apparently more venturesome and gave much freer, more imaginative, often humorous and off-beat answers. Consider these two responses to a picture showing an adult sitting in a plane<sup>31</sup>. One of them is by a high IQ score child, the other by a high creativity score child:

- 1. Mr. Smith is on his way home from a successful business trip. He is happy and he is thinking about his wonderful family and how glad he will be to see them again. He can picture it, about an hour from now, his plane landing at the airport and Mrs. Smith and their children all there, welcoming him home again.
- 2. This man is flying back from Reno where he has just won a divorce from his wife. He couldn't stand to live with her anymore, he told the judge, because she wore so much cold cream on her face at night that her head would skid across the pillow and hit him in the head. He is now contemplating a new skid-proof face cream.

One significance of Getzels and Jackson's work was that they found teachers preferring the high IQs to high creatives even when grade-wise both had performed equally well. And this, in America, in a private high-brow school! The high creative, with his/her moodiness, unpredictability, penchant for humour, habit of questioning basic premises, and so forth, is often a menace to the ordinary teacher, while the high IQ child, bright and eager to please the teacher with his/her regurgitation of the teacher's ideas or information provided by the teacher, tends to become the teacher's pet. This points to the monumental tragedy of the educational system the world over. To begin with, we use entrance tests and examinations where we assess primarily memory and convergent thinking ability. The selection of the top 20% in IQ may eliminate 70% of the top 20% in creative thinking.<sup>32</sup> As teachers, we further discourage divergent thinking in the classroom. No wonder then that those we call our best students fail often miserably to do anything original or outstanding in life, and quite commonly the so-called difficult student with an overall mediocre record but brilliant performance in topics of interest to him/her blossoms out in life. Newton and Einstein, be it noted, were considered dullards at school. I leave it to you to speculate on the cultural consequences of centuries of wholesale discouragement of creativity and divergent thinking in our schools and academic institutions.

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#### CONCLUDING COMMENTS

Creativity, as a field of knowledge, seeks to explain how humans, either individually or collectively, reach solutions or produce works that are both novel and useful, the kinds of personality traits that help humans to reach creative solutions, and the mental skills and problem-solving techniques through which creative solutions may be found relatively quickly or inexpensively. Creative thinking is particularly useful for problems that are open-ended, that is, problems that have no single right answer.

Human creativity is far more abundant than generally imagined. People manifest creativity in their dreams, speech, social interactions, and in the hundreds of thousands of products, services, and activities they design and develop. Although creative geniuses are rare and wonderful and must be nurtured, it is equally important—both for civilization and for the social and economic development, especially of poor societies—to create conditions in which the masses can be creative. The purpose of this book is to help large numbers of people access and develop their dormant creativity, and to help them turn into creators for life.

In the next chapter, we take up a vitally important issue–*can creativity be enhanced*? In the chapter after that, we discuss several questions that laypersons have about creativity, such as whether creativity dims with age; whether highly creative people are mad; are the poor as creative as the well-to-do; and so forth. In later chapters, our exploration will take us to the roots of our creativity as a species, different forms of creativity, deeper understanding of creative personality, creative intelligence, the creative problem-solving process, creative environment, techniques of creativity, etc.

At the end of each chapter, a 'quiz' is provided. It contains questions to test the reader's understanding of the material in the chapter. Also provided is a 'mental gym', which consists of exercises for developing the reader's creativity-related capabilities. Doing these exercises diligently will help the reader master the 'principles' of creativity, so that they permeate all that he/she does in a spontaneous manner. These exercises can be fun for the family and can also be used to train others in creativity.

Quiz



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The following quiz is designed to help you to make sure that you have understood the basics of the chapter.

I. When can accounting be a more creative activity than research?

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- 2. Is creativity 99% inspiration and 1% perspiration?

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- \*\*\*\*\*\*
- 3. How far do you agree that facts are more important than imagination?

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- 4. A creative person will tend to be (tick one)
  - a. Imaginative and pragmatic
  - b. Imaginative but impractical
  - c. Highly evaluative
  - d. Quite indecisive
- 5. Are the following statements true or false? Why?
  - a. Only artists are creative.
  - b. People who produce a lot of ideas seldom produce an original one.
  - c. Highly intelligent persons are also usually creative.
  - d. The more deeply we understand reality, the greater impact will our creativity make.

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#### MENTAL GYM

- 1. Let us see how fast you can list things. You have 2 minutes per item.
  - a. List insects, fruits, vegetables, flowers, and trees whose names begin with the letters a, e, or o.

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- b. List as many improvements or innovations as you can in the game of cricket (or any game that you are familiar with).

c. List items that are rectangular and heavy (e.g. car's chassis).

.....

- 2. Let us see how ingenious you are in combining your senses. Given below are several pairs of stimulus words. In each pair, one word indicates one sense and the other points to quite a different sense. We would like you to draw brief word pictures that utilize both stimulus words. For example, sweet smell and rough texture can make one think of dried rose petals, freshly baked bread, earth after the first shower, scented bread, and so on. You have 2 minutes per item.
  - a. Silk texture and the smell of rotten eggs

b. Sour taste and a monotonous drone

.....

rustic simplicity

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3. Can you make the following drab headlines come alive? Replace each headline with an arresting, dramatic, or poetic one. (2 minutes each)

N-PLANT PLAN HELD UP (e.g. FREEZE ON FISSION) FOUR MILITANTS KILLED IN KASHMIR

- 4. There is a burst of creativity when two or more concepts, approaches, or patterns of thought are fused together into new ones. This often results in an original idea or point of view, and as Arthur Koestler has observed, the imaginative and unexpected fusion of previously unrelated concepts or frameworks is the basis of a good deal of the best tragedy, comedy, art, and science. In sum, what is original is often the unusual fusion of the familiar. Some practice in fusion should, therefore, enhance one's originality. Here are some exercises to help you practise fusion.
  - See if you can spot the well-known products or activities that are fusions of the (i) principles or ideas stated at the left. (5 minutes) Example See-saw + comfort + seat Rocking chair = Transparency + storage + portability = a. Store of knowledge + universal or b. mass access + compactness = c. Flow of current + ease of manipulation = All-weather operation + connection d. + fixity = Rhythm + tune + rustic simplicity e. + feeling = Now, try to invent a new product or activity by fusing the principles stated at the (ii) left. (9 minutes) Transparency + rhythm + mass access a. = Connection + store of knowledge + tune b. = All-weather operation + flow of current + c.

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- (iii) Do the following as imaginatively as you can. (3 minutes each)
  - a. Ambitious assistant + trusting old boss = (write a comic outcome)
  - b. Ambitious assistant + trusting old boss = (write a tragic outcome)
- 5. Just as fusion or synthesis is a prime source of originality, fission or analysis also greatly helps originality. But the analysis is of a special kind. The ability to reduce an object or an event or an activity to first principles, basics, or fundamental properties is an analytical ability of very great assistance in finding original solutions. For, if one can reduce an object to first principles, that is, if one can understand why the object or event or activity is what it is, or how it is put together, then one can make significant alterations in the causal forces and thus secure an original transformation in the object.

Find the basic concepts or principles underlying each of the following. (1 minute each)

a. Injection

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- b. Toothbrush
- c. Conflict
- d. Friendship =
- e. Marriage

Can you now think up some improvements/modifications in each of the above? (2 minutes per item)

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## Can Creativity be Enhanced?



The ancient Greeks used to think that Muses, the 9 daughters of Zeus and Mnemosyne, inspired poetry and the arts in humans. Much later, during the Romantic Period in Europe, it became popular that creativity was located within our imagination and our emotions, not governed by any supernatural entities. Still, many writers, music composers, and artists claimed that during creation they were 'possessed', that is, they were driven to create by a force over which they had no control.<sup>1</sup> Some of them apparently still feel possessed. Steven Bindeman reports: "... for many artists, the experience of being merely passive receptors, with the spiritual force of creativity speaking in some mysterious way through them is very profound."<sup>2</sup> Following the work

of Francis Galton and Charles Darwin, the notion grew that all our capabilities, including creativity, are the result of our genetic inheritance.<sup>3</sup> The impression, therefore, grew that creativity is fixed at birth, and one can do nothing to alter it. In the 20<sup>th</sup> century, however, research confirmed that people's creativity can be considerably enhanced, even if it cannot be equalized with that of 'geniuses'.<sup>4</sup>

The view that creative achievement can be enhanced or made more probable through the orchestration of many forces has gained • momentum (see Figure 2.1). These forces include involve certain

Men are not prisoners of fate, but only prisoners of their own minds Franklin Delano Roosevelt

personality traits and motives, certain mental capabilities, the characteristics of the environment one is in, the use of the creative problem-solving process, certain amount of expertise relevant to the field in which creativity is attempted, and the use of various techniques for stimulating creative solutions to problems. The right combination of personality traits, creative intelligence, creativogenic environment, creative problem-solving process and techniques, etc. can greatly increase creative potential. In Chapter 1, we have already touched upon the creative problem-solving process (problem restructuring and cycles of convergent and divergent thinking) and creative intelligence (various mental abilities like fluency, flexibility, problem sensitivity, problem restructuring capability, etc.). Let us now briefly outline some other forces that can enhance our creativity, particularly creative personality, creative environment, and creativity technology.

## **CREATIVE PERSONALITY AND MOTIVATION**

Research conducted all over the world suggests some core traits of creative people–that by and large they are curious, complex, sensitive, independent, persistent, venturesome, self-sufficient, imaginative, and yet realistic.<sup>5</sup> Many have a need to be different, to pioneer, discover, innovate, and create.<sup>6</sup> Even when they have a touch of madness, they are usually able to harness it to make their creation arresting (see box on *The Person behind the Creative Pen*)<sup>7</sup>.

Not to be underrated is the role of motivation. The Jews are known to be over-achievers. There is no evidence that Jews are genetically different from other whites. Yet, per capita, they have won 55 times the Nobel prizes won by the French, 7 times those won by the Germans, and 16 times those won by the Italians.<sup>8</sup> It is also known that the expectations of persons whom we respect powerfully shape our motivation and behaviour.<sup>9</sup> The research of Wallach and Kogan and others shows that scores on tests of creativity go up when subjects are exhorted to be creative by the experimenter.<sup>10</sup> While evaluation tends to dampen creativity, possibly because of the test anxiety it generates, reward for being creative tends to stimulate creativity.<sup>11</sup> In later chapters (Chapter 12 and 13), we discuss at greater length how we can acquire more of the nearly 30 traits of creative people, strengthen those motives that facilitate creativity and innovation, and remove seven mental blocks to creative functioning.

### **CREATIVE ENVIRONMENT**

Our environment is partly given and partly is of our own creation. We do not have much choice about the country, community, and family we are born into, but as adults, we can choose, to some





### The Person Behind the Creative Pen

What kind of people are creative writers? An in-depth study of 30 creative writers at the Institute of Personality Assessment and Research at the University of California at Berkeley, US, yielded several insights. The creative writers appeared to have high intellectual capacity and genuinely valued intellectual matters. They were concerned with philosophical problems such as the meaning of life. They had unconventional thought processes. They were arrestingly interesting.

Besides these cognitive characteristics, they also displayed several other traits. They valued independence and autonomy; they aimed high; they had a wide range of interests; they were straightforward and forthright in dealing with others; they behaved in an ethically consistent manner. They were verbally fluent and expressive and were aesthetically sensitive. And they were productive.

When these creative writers were compared with ordinary writers vis-à-vis a test called Minnesota Multi-Phasic Inventory (MMPI), some interesting personality differences emerged. The creative writers exhibited stronger symptoms of personality disorders—depression, hysteria or excitability, paranoia or a sense of being persecuted, schizophrenia or split personality, mood swings, and so forth.

On the other hand, the creative writers scored substantially higher on 'ego strength' than the ordinary writers. Ego strength is a measure of maturity, self-control, and the capacity to balance the urges of one's impulses and one's conscience. Thus, the creative writers were both abnormal and normal, capable of harbouring very dark thoughts and feelings but also capable of retaining their sanity, and indeed, putting their impulses to good use in their creative writing. This is an unusual capability. In the general population, ego strength and personality disorder are strongly negatively correlated, that is, if one is high the other is low, and vice versa. In the creative writers, both were high, and perhaps this enabled them to dive deep into the dark recesses of the soul—and come up bearing literary gifts.

The creative writers were also compared to ordinary writers on another personality test called California Psychological Inventory (CPI). This test also revealed some interesting differences. It is not easy for us to accept ourselves as we are. The creative writers scored

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substantially higher on self-acceptance than the ordinary writers. Another big difference was on 'femininity.' Femininity measures receptivity, and interests traditionally associated with women, such as interior decoration, and other arts. It is also a measure of sensitivity and openness to feelings and emotions. Similarly, the creative writers were also substantially higher on 'tolerance' and 'flexibility'. They were, on the other hand, substantially lower on 'self-control,' 'good impression,' and 'achievement through conformance.'

On another test, the Myers-Briggs Type Indicator (MBTI), the creative writers did not differ substantially from ordinary writers. The overwhelming majority of both groups was categorized as intuitive (versus only 25% or so of the general population).

The picture, therefore, of creative writers is of highly gifted, aesthetically oriented, intuitive, but troubled minds that do not, however, repress their fears and forebodings. Instead, they accept themselves as they are, are tolerant and flexible without being conformist, have many interests, are rather independent even if this irritates current opinion, and despite their inner turmoil, have a firm grip over themselves.

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extent at least, what kind of higher education we want, where to get it, what kind of work to do, what sort of spouse and friends to have, what hobbies and interests to pursue, and so forth. Research indicates that various features of our environment can profoundly influence our creativity.<sup>12</sup>

The support that environment may give to one's creativity is illustrated well in Ashis Nandy's account of two famous Indian savants, Jagdish Chandra Bose, renowned physicist and botanist, and Srinivasa Ramanujan, mathematician.<sup>13</sup> Nearly a century back, Bose experimentally demonstrated that plants feel and react to various stimuli, almost in a human fashion. Bose was blessed with a supportive environment. An only son, he was born in a reasonably well-to-do family–his father was a magistrate. Bose had two servants at his disposal–one a former robber and the other a former sepoy–both sources of rivetting tales. Bose's father was a versatile man–entrepreneur, amateur physicist and botanist, promoter of technical education, part-time engineer, sportsman, and part-time social worker. Bose's mother was a devout Hindu, while his father was a member of the reformist Brahmo Samaj. Bose, therefore, had a broad range of

influences at home, ranging from Western scientific and Hindu reformist to Hindu traditional. He went to a village school founded by his father, which provided him with still another exposure—to rural India. He was brought up in the eastern part of Bengal, whose residents were looked down upon by the elite as country bumpkins but were also grudgingly respected as aggressive achievers. Though the father was a government servant, he was also a nationalist, and Bose seems to have absorbed this nationalism as evidenced by his campaign to found an Indian science free from Western control. Bose studied at St. Xavier's College where he became a protégé of Father Lafont, then the best known professor in India of experimental physics. Later, when he went to Christ's College, Cambridge, he came into contact with Lord Raleigh, a famous physicist of his day. Bose's wife was educated, and came from a reformist family. She had studied four years of medicine, and she strongly encouraged Bose to take up research. Bose's exposure to Upanishadic Hindu philosophy–the notion that God pervades all–reinforced by his friendship with Sister Nivedita of the Ramakrishna Order may have encouraged him to look for common factors between animate and inanimate life forms. It is obvious that Bose's circumstances were particularly favourable to the flowering of his genius.

Contrast the support that the environment provided to Bose with the difficulties the environment created for another Indian genius, Srinivasa Ramanujan, the short-lived precocious mathematician. He was born in a poor, nondescript Brahmin family in South India, received a low-quality education, flunked out of college, had to work as a clerk, and, at 22, married a girl who was 13 years his junior. Though he discovered on his own several important theorems, because he was unacquainted with modern mathematics his was largely a wasted effort, for he had rediscovered the theorems discovered previously by such great mathematicians as Euler, Bauer, and Riemann. His friends felt that if he had had better formal education, he might have been able to revolutionize mathematics.

In a later chapter (Chapter 14), we discuss in more detail the kind of environment that encourages creativity, and how to go about acquiring it.

## **CREATIVITY TECHNOLOGY**

Over the years, nearly 200 techniques for generating creative solutions have been identified.<sup>14</sup> The major techniques include brainstorming, checklist of questions, attributes changing, morphological analysis, and synectics. All of them provide help in divergent thinking but are based on different principles.

The most widely used technique for generating creative ideas is called brainstorming.<sup>15</sup> It was the brainchild of Alex Osborn, an advertising executive. It is a group technique but it can also be used by individuals. The brainstormer takes up a fairly clearly-stated problem which has many

possible solutions, such as how to increase productivity in a plant or how to interest children in science. Thereafter the brainstormer (individual or a panel) is encouraged to 'brainstorm,' that is generate in a rapidfire fashion novel solutions to the problem. During this brainstorming phase, all criticism or evaluation of any idea is taboo.

Another technique is checklist of questions, also developed by Osborn.<sup>16</sup> This consists of subjecting a product or a system or a process to a barrage of questions. Some of these are quite straightforward, such as how can we modify the item to make it more economical, or can we find other uses of the item; or what could we add to or delete from it to make it more elegant, more practical; etc. Some questions stimulate more far-reaching search, such as how do we miniaturize or minify it; or how do we magnify it many times; or what is its opposite? These questions can force dramatic shifts of perspective, and open up radically different options.

Crawford's attributes changing technique is founded on the principle that most tinkering creativity is based on changing an attribute of the present solution or product, or grafting on to it the attributes of something else.<sup>17</sup> Room air-conditioning, for example, involves grafting on to the ambient air in the room the coolness of the air available at heights; apartments in high-rises involve the grafting on to high-altitude homes self-propelled ladders that we call elevators. There are limitless ways in which we can change the present characteristics of any product, service, event, relationship, or state. Take a pillow, for example. One can change its shape, colour, smell, feel, thickness, size, stuffing, cover, and so on.

Morphological analysis makes systematic Crawford's attributes changing.<sup>18</sup> It involves identifying a few alternatives for each of the attributes we want changed in a thing. If there are five attributes of a pillow we want to consider changing (say shape, colour, smell, size, and feel), and we can think up, say, three interesting alternatives for each attribute, we could generate – in minutes – 3<sup>5</sup> or 243 different designs of a pillow!

Synectics, a group technique invented by Gordon, specializes in using a variety of analogies in creative problem solving.<sup>19</sup> There are four chief ones. The first involves discussing an analogy of the problem situation from a very different field. For example, if the problem is one of making a submarine that can dive deep, the group may explore how some whales are able to dive nearly a mile and so fast. If the problem is of raising water cheaply from a valley on to terraces for farming purposes, the group may discuss how the sap rises hundreds of feet in giant redwoods. If there is a great deal of industrial indiscipline in a factory, the synectics group may discuss how discipline is maintained in a beehive. The second, called personal analogy, requires the problem-solver to project himself into a situation and report what he experiences. Thus, if one is looking into the causes of metal fatigue in jets, the group members are asked to imagine themselves to be metal in a jet flying at a high altitude, and report what they feel-see-hear-smell-taste! This subjectification of an object of inquiry sometimes yields dramatic insights. The third analogy used in synectics is the fantasy analogy, in which the person is asked to release his/her imagination from real-life

constraints, and in effect daydream–what would happen if food became unlimited or if houses could fly or if telepathy became commonplace. Obviously, the fantasy requested has a relation–sometimes a remote relation–to the problem at hand. The fourth analogy is called the book title, and requires the members to furnish pithy but poetic or paradoxical phrases for a situation. For example, book titles for a gory battle could be Great Decimation, Migration to Hell, Vulture's Paradise, Dicey Valour, Finished Hate. Synectics has been successfully employed for finding innovative approaches to a number of intractable technical problems.

Synectics is a difficult technique, but its principle of constructive psychological strain is most practical. Basically, it consists of mechanisms–analogies and metaphors–that bend and stretch the mind in every direction through the stuff of poetry. It is a technique for churning the mind so that novel visions and insights rise to its surface.

Besides these techniques, which mainly help us generate innovative options, there are structured, step-by-step programmes for creative problem solving. One of them, which is reportedly available to nearly a quarter million students in North America and elsewhere, is called Future Problem Solving or FIS.<sup>20</sup> It is a six-step process.

- 1. Provide the problem-solvers with a fuzzy situation drawn from a general problem area (such as communal tensions).
- 2. Generate alternate problem statements of the fuzzy situation in a brainstorm mode. One way is to identify and articulate several sub-areas within the fuzzy situation, and identify different kinds of problems in each sub-area.
- 3. Get the problem-solvers to converge to one problem statement, or one problem statement per sub-area.
- 4. Generate alternative solutions to the stated problem(s) in the brainstorm mode.
- 5. Get the group to identify criteria of evaluation, and apply them to each alternative solution.
- 6. Identify recommended solution(s) that is/are best on the basis of these evaluation criteria.

We take a closer look at these and other creative problem-solving techniques and their underlying principles and applications in a later chapter (Chapter 15).

Can Creativity be Enhanced?

## **CREATIVITY TRAINING**

The various levers for raising people's creativity have fructified into several creativity training programmes. Some of these have even found large corporate clients. For example, Ford and Harris concluded that by the early 1990s, over half of the 500 largest US corporations had adopted some or the other form of creative thinking and/or innovative problem-solving training for their staffs.<sup>21</sup> Well-designed creativity training programmes seem to yield good dividends. In the late 1980s, Paul Torrance examined over 140 studies of creativity training programmes and concluded that there is sufficient evidence to show that creativity can be taught.<sup>22</sup> A survey of over 100 studies of creativity training programmes in the early 1990s, involving over 175 independent samples of subjects that had undergone training, concluded that creativity training is generally effective; however, it is more effective in enhancing creative performance on tasks similar to those used during training than dissimilar tasks.<sup>23</sup>

What are creativity training programmes like? Let me give as an example the one I developed in the late 1970s and have used with some variations for training a variety of groups. For designing the programme, I broadly utilize the model of creative achievement shown in Fig. 2.1.

Any kind of achievement is an outcome of factors like personality traits, mental abilities, motivation, and an appropriate environment, that is, one that provides certain kinds of stimulation, rewards, and opportunities. If there are serious deficiencies in any of these, the chance of achieving anything significant is likely to be rather slim. On the other hand, if there is an adequate level of each of these, the chance of success may be quite substantial, and indeed, the probability rises fast if any or all are strengthened simultaneously because of a compounding effect. Thus, just 10% improvement in creative personality, mental ability, and environment could lead to over  $30\% (110\% \times 110\% \times 110\%)$  increase in the capacity for creative achievement.

The emphasis in my creativity workshops is on strengthening certain personality traits like curiosity, courage, persistence, and independence; encouraging certain motives like the need to create, discover, pioneer, develop oneself, make a social contribution; and on increasing divergent and convergent thinking abilities like problem sensitivity, problem restructuring ability, fluency, flexibility, originality, elaborative ability, solution refinement ability, etc. Participants are made more aware of certain features of their home, social, and work environments so that they can try and make them more conducive to creative activity. The participants are also exposed to various techniques for producing creative ideas and to various mechanisms of convergent and divergent thinking. They also understand more clearly what it is that makes an outcome of human effort creative.

Frequently, I measure many of these motives, fears, mental abilities, and so forth at the beginning of the creativity workshop and also at the end of the workshop, to get some idea of the changes brought about by the workshop. So far, the participants have shown quite sizeable

increases in several creativity-related abilities, and a sizeable decrease in those fears that debilitate the desire to be creative, such as the fears of failure, of being confused, of social disapproval, and of being humiliated. There is less dramatic increase in the motivation to be creative because to begin with, due to the voluntary nature of these workshops, this motivation is high. Several individuals have afterwards reported that they got involved in creative activities. One banker started giving talks on creativity and took actively to public speaking. When he came to the workshop, he was quite a drab, mousy chap. An engineer participant later patented an invention. Another chap started going to schools to talk about creativity to students. A fourth started writing poetry. A fifth took a job in a creative ad agency instead of a perquisites-rich multinational, and later became the editor of a fine periodical on data processing. Several became entrepreneurs and passed up plush jobs in multinational corporations. Most report a much greater confidence in facing up to life's problems. Some have even organized workshops on their own, usually with some initial help from me.

The typical day begins at 9 a.m. with an hour of what I call mental gym. This consists of exercises pertinent to the day's theme and is designed to provide practice on some creativity-related abilities. This is followed by discussion of overnight readings, exercises, and what I call energizers. These energizers are designed to loosen up the participants. The participants do funny things like hopping on a leg, making weird sounds, imitating animals, freezing into statues, and what not. These provide opportunities to the participants to exercise all their senses and to display creativity in physical, non-cerebral activities. During the day, the participants may also be asked to process feedback from tests of creativity and to indulge in personal planning, such as how to go about getting rid of a troublesome psychological block, or how to strengthen a creativity-related ability. At the end of the day the participants reflect on the day's activities and jot down any bright ideas they might have had as well as anything that might not be clear to them. These bright ideas or unclear ideas are shared in the group. Occasionally, I invite someone creative to come and talk about his/her creative process and work.

This may sound like an easy pace. It is not. The participants and the trainer put in 10–12 hours of work daily for several days. While they get exhausted, they also find the workshop quite exhilarating. As I said earlier, the results are quite heartening. It would be interesting to trace the careers of these participants. The Appendix to this volume outlines a fairly typical workshop.

## **CONCLUDING COMMENTS**

So, can creativity be enhanced? Yes, of course, but only with some grit. The agenda of changes needed to achieve greater creative potential is a substantial and varied one. But where there is a will, there is a way, and where there is a way, there can be fun and exhilaration. In the next



## MENTAL GYM

Ι.	Think of the three greatest heroes of yours (these could be from real life or even mythology). How creative are they?
2.	Who in your family is the most creative? In what way?
3.	Who in your family is the least creative? In what way? What can you do about it?
4.	What are the five most important steps you would consider to enhance your creativity?
5.	Suppose a creative genius grows up among aborigines. How would the genius operate in this situation?

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# Puzzles of Creativity



There is a galaxy named Andromeda that one can see on a starry, hazeless night. It is but a smudge to our naked eyes but through the telescope it is a mighty, glittering universe. For many laypersons, creativity, too, is a smudge. If we aspire to be lifelong creators, we need to look at it without misconceptions and haze. In the previous chapter, we cleared up one misconception that creativity is God-given or heredity given. In this chapter, we clear up six other puzzles of laypersons.

- 1. Is creativity rare or widespread?
- 2. Is creativity age-afflicted or age-resistant?
- 3. Are the creative mad?
- 4. Can the poor be creative?
- 5. Are some races more creative than others?
- 6. Are men more creative than women?

A widespread belief is more likely to be foolish than sensible Bertrand Russell

## IS CREATIVITY RARE OR WIDESPREAD?

Peaks of creativity are, of course, rare, as are peaks of strength, beauty, or goodness. We are a gifted species, but feats like penning a *Hamlet*, or formulating the relativity theory, or inspiring *satyagraha* by the millions do come but once in a long while. But peaks are not the only attractive or important features of a landscape. There are also vales and moors and meadows and waters and woods. The layperson may look at the sun and conclude that there is no worthwhile light elsewhere. She would be mistaken. Lesser human creativity is scattered widely, like the lights of a city at night, and in its own way, is quite attractive and useful.

The layman tends to hold creativity in awe. He tends to associate it with the Einsteins, Picassos, Tagores, and Shakespeares of the world. The creative geniuses seem so far beyond his grasp that many a layman simply gives up all thought of being creative. But this is a grave error. The basic processes of the creative genius are accessible to the entire human race, not just to a charmed few. Every day–every night, too–each of us creates. Our conversations exhibit our creative power, for out of a vocabulary of tens of thousands of words, we pluck out the right ones and combine them–instantly–into varied sentences of effective communicative power. If we simply added up the *different* sentences each of us utters in a normal day, the number would be staggering, and the variety, breathtaking. Our creativity also manifests itself in the variety of unrehearsed roles we play spontaneously and with consummate ease–parent, spouse, child, boss, subordinate, colleague, friend, and so forth. Dreams are a further manifestation of our creativity; their creativity fully rivals the inventive power of an imaginative writer of fiction. Here is the reported dream of a subject participating in some research on dreams.

"It started out with me telling somebody about a murderer. The murderer was supposed to be in this house. I was telling two detectives a rather lengthy story about this gruesome murder. The idea was to lock them in this house with the murderer so they'd catch him. And my wife, a woman who was somehow related to me, was supposed to leave the house. So she went outside and I locked them in. Just as I finished locking them in the house, it occurred to me that it was a trick, and the murderer was this woman, and she was having me lock the detectives in the house so she could get me. Just as I went running down the porch stairs, this horrible knowledge dawned on me. I ran out into the yard and was kind of looking at the house. It was an old house on a hill. The yard was kind of roundish. Suddenly she jumped out of the bushes and began running towards me. She looked horrible. She was going to push me of the cliff– part of the hill was a cliff–or kill me somehow. Just before she got me she changed into a tiger–a tigress. At that moment I woke up crying out."

Dream research indicates that we get five to ten more or less unrelated dreams each night, mostly during the Rapid Eye Movement (REM) phase.<sup>2</sup> This is tantamount to our brain

producing five to ten short-duration feature films a night, each one on a different theme, in a different locale, and with a different cast! Occasionally, we even solve problems in a dream. Jack Nicklaus, the famous American golfer, 'saw' a better way of playing golf in a dream; Kekulé discovered the structure of the benzene molecule in a dream; Robert Louis Stevenson arrived at the plot of *Doctor Jekyll and Mister Hyde* from a dream of his; Tartin 'saw' and 'heard' the Devil play violin in a dream, which he wrote up when he awoke, as *Devil's Trill Sonata*; Nikola Tesla 'saw' the principle of the rotating magnetic field in a dream; and so forth.

Let alone dreams, speech, and role-play, even the so-called ordinary persons in 'less developed' societies can make creative contributions to business and profession. Meet some of them from India. L. Narasinga Rao, born in a family of musicians, was told by manufacturers that one could not miniaturize such hallowed large Indian musical instruments as the veena\* and tanpura\*. Mr. Rao made several alterations and successfully produced and marketed a guitar-sized veena and a miniaturized tanpura.<sup>3</sup> Kamalini Mahapatra, a housewife, won an award for women entrepreneurs for a capacitor unit she started in 1982 in Orissa and ran successfully despite competition from much larger and older units like Philips and Bharat Electronics.<sup>4</sup> Dr. T. Ravindranathan and his colleagues at Pune's National Chemical Laboratory, succeeded in replicating a process for making vitamin  $B_6$  that was closely guarded by multinationals like Roche and Merck, Sharp, and Dohme.<sup>5</sup> Ela Bhatt, a housewife, started SEWA (Self-Employed Women's Association), a poor women's welfare organization that was part trade union, part cooperative, part bank, and part business.<sup>6</sup> Her work won her the Magsaysay Award. Charles Correa won, in 1984, a coveted award by the Royal Institute of British Architects that architects of the calibre of Frank Lloyd Wright, Le Corbusier, and Buckminster Fuller had also won, for his boldly innovative designs that were closely attuned to the environment and local conditions.<sup>7</sup> There are thousands like these, though we need millions. Institutions like GIAN and Sristi have documented some ten thousand inventions, mostly in India's rural areas. The 2001 award winning inventions included solar power spectacles with light bulbs for night reading, a pressure cooker working on compressed air, a low voltage electric heater, a kerosene stove that saves upto 60% fuel, and an indigenous gas kit for mopeds.<sup>8</sup> Creative contribution is well within the reach of many, not just a few outstanding geniuses.

Of the thousands of mundane objects at home or in office that we take for granted, all but a handful have been invented or designed by 'ordinary' persons. True, the basic principles may have been discovered by the Newtons and the Marconis, but the chairs and the tables, the dishes and the appliances, the furniture and the foods, and the medicines and the beverages have been designed and developed by nameless thousands. As has been well said, "The person who invents a new window fastener, composes a college fraternity song, arranges items in a store in a new way,

<sup>\*</sup> The veena is a stringed instrument. The tanpura is also a stringed instrument used as a drone in Indian classical music.

or makes a pleasant design of the flower-beds in his garden, is performing the kind of creative act that, repeated a million times, benefits society perhaps as much as do the greater inventions."<sup>9</sup> Creativity may be the most ubiquitous of the traits that are distinctively human. As Guilford has put it, "Creative acts can…be expected, no matter how feeble or how infrequent, of almost all individuals."<sup>10</sup>

We must, of course, nurture and respect our creative geniuses so that they give their best to society. But creative geniuses in any case are bright and usually motivated enough to be creative. The real problem is how to help the less talented and the less motivated to develop their creative potential so that they can make a constructive contribution to social and economic development, arts, crafts, sciences, and professions. How do we turn the dreams of the millions into creative visions of self and society, commonplace speech into communicative excellence, and acquiescence with oppressive social realities into experimentation and creative initiatives? I believe this can be done. For one thing, past creative societies have often arisen from mediocre societies-classical Greece, China, and India, renaissance Italy, France, and Holland, 19th century Britain, and contemporary America are ready examples. Also, research shows that even intelligence levels can go up when appropriate social and educational inputs are made into a backward society.<sup>11</sup> Experience with creativity training also shows significant increases in the creativity of the participants through training.<sup>12</sup> This book is devoted to the task of helping not so much the geniuses but those legions of ordinary men and women who wish to bring out the extraordinary within them. It seeks to do so by de-mystifying the various forces that shape creativity, and by providing readers with opportunities to enhance their creativity through a better understanding of creativity and how it can be developed.

## IS CREATIVITY AGE-AFFLICTED?

Many middle-aged people give up on creativity—they feel too set in their ways, too hemmed in by responsibilities, or simply too 'old' to change. Are they right? In some aspects of life, people do peak in their twenties, thirties, and forties, after which their performance begins to decline. This is only partly true of creative people and their pursuits. In mathematics, indeed, highly creative work tends to peak in the twenties. But for most other creative pursuits, the peaks may well be long plateaus. John Dacey's study indicates that for most areas, a high level of creative achievement is curvilinear with respect to age.<sup>13</sup> It tends to increase, as skills grow, from childhood and adolescence upto early adulthood. Then there is a long plateau of stable creative output, and there may even be a general rise, so that in several occupations creative output may peak between the 40s and 60s, and may stabilize upto or into the seventies. Then decline may commence as infirmity catches up with intention and overtakes it. However, artists tend to buck the above trend. They tend to peak in their 40s but decline in their 60s and 70s to their levels in



their 20s. The above broad picture appears to be true of the quantity of creative output. Dean Keith Simonton, in his study of eminent people that could be called creative geniuses, found that the *quality* of work does not necessarily decline with advanced age; only quantity does.<sup>14</sup>

There is some confirmation of the research findings also for people in general. It has been found for ordinary people that several divergent thinking abilities associated with creativity, notably fluency, flexibility, and originality tend to be lowest between the ages of 10–12 years, tend to rise moderately during the ages of 13–17 to 40–60, and begin to decline during the ages of 61–84.<sup>15</sup>

The sum and substance of these findings is that if one has creative potential, creativity can be manifested upto almost any age except in senility, and the quantity and quality of creativity can, again upto senility, continue to grow rather than decline.

### **ARE THE CREATIVE MAD?**

In the popular mind, creative individuals, especially artists and scientists, are 'crazy'. As Dryden put it, great wits are sure to madness near allied. People point to the famous painter Van Gogh who cut off his ear in a bout of masochistic frenzy. There is, indeed, evidence that artists and writers suffer from mental illnesses proportionately far more than the general population. For instance, in Jamison's study of British and Irish poets born between 1705 and 1805, the poets were 30 times more likely than the general population to have symptoms of manic-depression, 10 times more likely to commit suicide, and 20 times more likely to have been committed to the asylum; and in her study of 47 eminent British writers and artists, nearly two in five had been treated for mood disorders, as against 1% of the general population.<sup>16</sup> Arnold Ludwig found in his study of 137 well-known visual artists, that the rate of mental illness in them was relatively high.<sup>17</sup> These findings do not mean that every creative writer or artist is unbalanced; only that compared to the general population, writers and artists tend to have higher proportions suffering from mental disorders. The majority of creative writers and artists, and the vast majority of creative scientists and professionals are as sane (or insane) as the rest of  $us^{18}$ , and even among the creative writers and artists that are manic-depressive, most have lucid periods and mild mood elevations called hypomania during which they are sane enough to be productive.<sup>19</sup>

Most of the creative persons, however, are mad in a special sense–they think the seemingly unthinkable and do the seemingly undoable.

Only a mad man-or an agent of Satan-could, in the 16<sup>th</sup> century, blaspheme, as Galileo did, that the planets revolve around the sun. Similarly, Monet, the moving spirit behind impressionism, was castigated by critics for painting his 'impressions' rather than the 'real' thing. It is in being original that the creative are odd, not necessarily in their idiosyncrasies. Both Wallace Stevens and T.S. Eliot were perfectly respectable business executives despite being original poets. Except for absent-mindedness, which Einstein shared with a large number of quite ordinary academics, Einstein had no major quirk. To be sure, there are quite Bohemian creative painters and poets, but there is no evidence that they are any more so than the run-of-the-mill painters, and there are plenty of creative painters and poets and scientists and architects that are as 'normal' as the non-creative fraternity.

What, however, is quite striking about creative individuals is that their head may be in the stratosphere but their feet are firmly planted on the ground. Many of them are fascinating



Puzzles of Creativity



combinations of a flaming imagination and a very earthy practicality. Tagore, for instance, SO mystical and lyrical in his writings, was also a meticulous keeper of the accounts of his Beethoven, estate. one of the greatest composers of symphonies, was a shrewd bargainer when it came to his royalties. Goethe was a magnificent poet, and Leibniz was an original mathematician; both,

very pragmatic statesmen.

In an intriguing piece of research, psychologists measured various forms of psychopathology such as schizophrenia, hysteria, etc.20 They also measured 'ego strength', that seems to measure not vanity but reality contact, adaptability, sense of adequacy, mental balance, capacity to integrate apparently opposed views, self-control, and emotional maturity. In the general population, measures of psychopathology and ego strength are negatively correlated. In other words, there is a marked tendency for those individuals having bizarre fantasies and mad impulses to be low on maturity, and for those with leaden imaginations to be quite realistic and mature. On the other hand, in a sample of creative individuals, these were both high! That is to say, the creative person was both mad and mature. Ordinary people seem to choose between a life of imagination and a life of practicality. Creative individuals tend to prefer a life of both imagination and practicality.

This intriguing difference between ordinary and creative individuals need not exist, at least not so sharply. Even ordinary people can be trained to be more imaginative without relinquishing their hold on practicality. The key seems to be to help people to learn not to censor strange ideas prematurely. Most people, by the time they grow up, learn to scuttle their own imagination and impulses. The main cause seems to be excessive concern about what is socially considered right

Lifelong Creativity

## **CAN THE POOR BE CREATIVE?**

get enriched by imagination.

Some forms of creativity require a fair amount of material resources—big oil paintings for instance, or sophisticated mechanical inventions. Quality education of a liberal kind—often *not* available to the poor—may also facilitate creativity. Thus, it may be that the poor may have lower creative outputs than the well-to-do. On the other hand, necessity is the mother of inventions and the poor may be more motivated to adopt ingenious means in meeting their needs than the comfortable social classes. Let us look at the research evidence.

There is evidence from Australia that the socio-economic level of an area is correlated with creativity scores; that is, the higher this level, the higher the average creativity scores of people in the area.<sup>21</sup> Some Canadian research also points to this social class effect. In a study of over 1400 school children, divergent thinking ability was higher in kids coming from higher social classes than in kids coming from lower social classes.<sup>22</sup> On the other hand, a French study of kids indicated that under-privileged kids had higher creativity scores than privileged kids!<sup>23</sup> Indian studies indicate that higher creativity is associated with the middle instead of the lower classes.<sup>24</sup> But then, in one study the total creativity score of tribals was not lower than that of non-tribals.<sup>25</sup>

Paul Torrance has reported that in 16 different studies he conducted in the US in 1971, he found no material difference in the divergent thinking test scores of black and white American children, nor any in the test scores computed for different socio-economic classes.<sup>26</sup> Indeed, in a brainstorming contest between 10 dyads consisting of black children from disadvantaged backgrounds who had undergone a three-week creativity workshop, and 10 dyads of other children, the blacks outscored the latter dyads (mostly from relatively more affluent families) by a margin of 2 to 1! Their originality score was also higher.

So what are we to make of these findings? The social class *per se* may not significantly affect creativity in those societies which try to reduce the disadvantages of poorer people through compensatory training, facilities, opportunities, incentives, etc. Cultural factors may have stronger influence on creativity than class membership or income level. Within any social class there may be both conservative and liberal sub-cultures. The liberal sub-cultures are likely to manifest more creativity than the conservative sub-cultures. The sort of creativity under consideration may also matter. If sophisticated forms of creativity are being considered such as in



'high' art and science, those social classes that have exposure through education to such forms will certainly outscore those classes that do not have equal exposure. But mundane creativity related to making a living, running a home, or in getting by in society may not depend much on how elite the social class is. Yes, extreme impoverishment may be adverse to creativity, especially if it is associated with a conservative culture. But quite likely, the working classes may have an edge over the socio-economically higher classes when it comes to mundane ingenuity.

## ARE SOME RACES MORE CREATIVE THAN OTHERS?

Racial explanations of differences in human achievement have been quite controversial. Francis Galton thought that the Negro race was intellectually inferior to the Caucasian race.<sup>27</sup> J. Philippe Rushton has done a study, published in the 1980s, of the differences between Caucasians, Negroids, and Mongoloids.<sup>28</sup> He compared their average cranial capacity, brain weight, IQ test scores, rates of physiological maturation (e.g. age of walking, sexual maturity, pregnancy, etc.), temperament (e.g. aggressiveness, impulsiveness, sociability, anxiety, etc.), social traits (e.g. mental health, marital stability, lawful behaviour), etc. He claimed to find that on all these traits, the Mongoloids were supreme, followed by Caucasians, followed by Negroes. Rushton has tried to explain some of these differences in terms of ecological conditions in which each race evolved. Some others have claimed to find that the relative racial contributions to human civilization also follow the same order as the measured racial intellectual and physiological competence.<sup>29</sup> But if race is a critical factor in societal creativity, racial superiority in societal creativity should (1) manifest itself more or less throughout recorded history and (2) the contributions of various sub-groups within each racial group should be more or less similar, and lower than those of the sub-groups of the allegedly superior races. Both these are patently not true. Nearly 5000 years ago, all the three races were more or less equally primitive. Some differences have emerged in the few millennia just passed. But who can tell their relative contributions in the next 5000 years? Besides, there are large differences in the creative contributions of different sub-groups within each race. Among those considered Mongoloid, there is a world of difference in the creative achievements of the Chinese, the Mongolians, the Japanese, and the Tibetans. There are equally large differences in the achievements of such Caucasians as the Russians, the Greeks, the Germans, the English, the Scandinavians, the Turks, and so forth. There are also striking differences in the achievements of the people of Benin in modern Ghana, the Negroes of the US, the Masai of East Africa, and the people of Congo-all sub-groups of the Negroid race. Can it be said with any credibility at all that the creative achievements and contributions of the Mongolians, the archetypal Mongoloids, are superior to those of the people of Benin or the US Negroes? And then, how do racial explanations take into account the huge fluctuations in the creative achievements of sub-groups over centuries? The Germans were savages 2000 years back. In the

20<sup>th</sup> century, their creative contributions were among the greatest of all nationalities, Caucasian or otherwise. In any case, as the world is turning into a global village, and people of all the races mate freely with each other, race as a significant predictor of creative achievement is tending to evaporate.

### ARE MEN MORE CREATIVE THAN WOMEN?

Gender-related differences in creative potential are equally contentious. Tests of creativity have not revealed any consistent female inferiority across the globe, except in traditional, male-dominated communities. For instance, in a comparative study of American and Israeli (Arab) children, while the Israeli (Arab) boys outscored the girls on 9 out of 13 creativity measures, the American girls outscored the boys on 2 measures, with no significant difference on the remaining 11.<sup>30</sup> In an Indian study of 270 adolescent boys and 270 girls, the boys had a higher total score on tests of divergent thinking. But the gap narrowed quite a bit by the 10<sup>th</sup> standard, and the biggest difference was not gender-related but location-related. Children going to urban schools had far higher scores than those going to rural schools.<sup>31</sup> However, in many fields, the men-women ratios of significant contributors heavily favour males. According to Simonton, in Western civilization, women make up just about 3% of the most illustrious figures of history, only 1% of science notables, and 10% of literary notables.<sup>32</sup> But how far is culture to blame for this? In most societies, and for thousands of years, women have been denied education, 'male' occupations, and the freedom of action enjoyed by the males. As women get empowered through education, equal opportunity, removal of various taboos, economic independence, and so forth, we may find dramatic changes in the achievement ratios in favour of women. Besides, as women recognize-and honour-their differences from men, they will tend to make distinctively feminine contributions to various arts, sciences, and professions.<sup>33</sup> Also, as of now, women still opt for certain traditional occupations such as home-making, teaching, nursing, and cooking. Women may be displaying high orders of creativity in these, but the social visibility of these occupations tends to be low, and therefore, women's creative contributions tend to be under-recognized. And then, when it comes to high-quality professional work, there is often a direct conflict between maternity and career in those years (25 to 40) when creativity tends to peak in many fields.<sup>34</sup> Society will need to resolve some of the dilemmas faced by talented women to enable humanity to secure the benefits of their distinctive creativity.

There is also a question of motivation. In an American study of 125 male and 177 female collegians, a major difference was in 'quest for power', that seems more like a quest for success and prominence.<sup>35</sup> This factor was an aggregate of 'dominance' (assertive manipulation of others), 'narcissism' (preoccupation with the self), 'achievement' (surmounting of obstacles and proving of

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Devara Dasimayya (10th century poet, South India)

personal worth), and 'fantasized achievement' (daydreaming of success in achieving personal recognition and distinction). On an average, the females scored about 25% lower than the males.

There may also be a question of anxiety. In an Indian study of 200 teacher-trainees, no difference was found in the divergent thinking skills of women and men, but the women's anxiety levels averaged over 40% higher.36 Low success motivation and high anxietygeneralized fear of failure-may, in combination, apply paralysing brakes to women's creative initiatives in a harsh, competitive, male world. Perhaps women should

network or band together more for creative initiatives; may be they should identify new fields or niches for creative initiatives in which male competition is low, or intuition, nurturance, altruism, and aesthetics provide competitive advantage over dominance and aggressive self-centredness; may be they should consider failures as having high learning value, as being stepping stones to success; may be they should acquire capabilities—especially managerial capabilities—that help them compete more effectively with men; and may be they should avail a lot more of creativity training.

## **CONCLUDING COMMENTS**

Is creativity rare or widespread? It can be rare in oppressive and conservative cultures, but come freedom, and creativity blooms like wild flowers. Is creativity age-afflicted? It can be age-afflicted for those who get into a rut and do nothing about it. But if they break free of the shackles of habits and routines and rules, the vista of a prolonged youth well into the sixties opens up. Are the creative mad? They may appear mad to those who have lost their sensitivity and imagination. But if they regain them, the creative will look pretty sane. Can the poor be creative? Of course they can be, and indeed, if they utilise creativity, they may not remain poor for long. Are some races

more creative than other races? Of course, if they have the right resources and freedom and a culture of innovation. But not for long if the 'less creative' races get hold of these, too. Are men more creative than women? Of course, since they do not, by and large, have to cook, bring up children, and turn a habitat into a home. Once men share these chores, the picture may change.

If we want lifelong health, wealth, or happiness, we need to know where it comes from. Likewise with creativity. If we want lifelong creativity, we need to probe into where it comes from. So, in the next two chapters we probe into the physiological, mental, spiritual, and social roots of our creativity.



I. If human creativity is so widespread, how come the pygmies of the Kalahari desert in south-west Africa have remained relatively unchanged for thousands of years?

.....

2. Creative novelists tend to remain creative well into their middle and even old age, but creative mathematicians and lyrical poets seem to burn out by their thirties. Why?

3. Is originality a form of madness? Is madness a form of originality?

......

4. Where would you expect to find large differentials in creativity among

socio-economic classes—in societies with a welfare state or without it?



5. Why should Arab lads in Israel outscore Arab lasses in Israel on creativity tests, while American lads do not outscore American lasses?

.....

## MENTAL GYM

1. Write a short story about a creative Masai girl. (Masais are a cowherd community of East Africa).

2. Suppose you are in the Peace Corps established by President Kennedy of the US, and land up in a village in Sudan in which two communities are engaged in revenge killings for decades. Can you think of any creative ways to get both the communities to give up the bloodshed?

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## The Body and the Mind as Roots of Human Creativity



We humans (*Homo sapiens sapiens*) emerged on the earth some 100000 years ago. In terms of geological time, this period is merely the blink of an eye. But in that trice, the human turned into a tool maker, an artist, a scientist, a writer, an inventor of ideologies, a citizen, a saint, and a sinner. From caves, the human moved to skyscrapers; from eating roots and raw meat, to

the infinite delicacies of the global eatery; from an average life span of around 25 to three times that number; from a marginal species that often had to scavenge the leftovers of lions to the world's only superspecies. How do we explain this immense and variegated creativity? What is it within us, and indeed, between us, that propels this hurricane creative urge?

All the soarings of my mind begin in my blood Rainer Maria Rilke

## **BIOLOGICAL ROOTS OF CREATIVITY**

Nature is a boundless storehouse of mechanisms that work, and its study can stimulate many creative human applications. Nature forges ingenious solutions to problems that living organisms encounter repeatedly-threats of predators, attacks of disease causing organisms, hunger, sexual deprivation, and so forth. Camouflages are often highly ingenious. The immune system is incredibly complex and intelligent. A great diversity of methods is used by living organisms to procure food and mating partners. Nature's unending source of ingenuity can be creatively adapted for human ends.<sup>1</sup> The mechanisms insects and birds use for flying, fish and whales use for deep diving, plants use for utilizing solar energy, and all sorts of species use for capability building have inspired innovations in the design of flying machines, submersibles, greenhouses, solar cookers, and the like.

The nature of the living organism predisposes it towards exploration, if not creativity. A number of studies suggest that all organisms, human and others, are motivated by a need for stimulation rather than driven only to seek rewards and avoid punishment.<sup>2</sup> In humans especially, novelty and curiosity are powerful motivators of exploratory behaviour.<sup>3</sup>

But there is an even more direct biological source of human creativity. The design and functioning of our body has facilitated our prodigious creativity as a species compared to all other species on earth. Let me discuss the role that three organs of our body have played in the flowering of our creativity–our limbs, our vocalizing system, and our brain.

Among mammals, we are perhaps the only species that is purely bipedal. Our primordial predators—lions, tigers, leopards, bears, etc.—are quadrupeds, and even our cousins—the great apes—are primarily quadrupeds but occasionally shuffle about clumsily and vulnerably on two feet. Being bipedal conferred a huge advantage on us—the free and varied use of our hands. With these hands, aided by opposable thumbs, we could not only climb, seize, and strike but also carry, gesture, shape tools, paint, carve, sculpt, and later on, write. The brain and the hands may have developed a symbiotic relationship with the brain driving the hands to newer and newer, more and more complex uses, and the complex and varied actions of the hands differentiating the brain more and more in terms of increasingly numerous brain centres housing the skills of the hands. It is no wonder that some of the largest concentrations of nerve fibres emanating from the brain end up on our palms.

Our vocalizing apparatus, too, may have stimulated our creativity.<sup>4</sup> Most animal species, including the great apes, can scream, chatter, whimper, grunt, groan, and roar–but they cannot speak. Their vocal chords are not developed enough to form words as spontaneously and copiously as our vocal chords. With the help of our lips, tongue, and teeth, our vocal chords enable us to articulate a prodigious number and variety of communications through words, sentences, and inflections. This uncommon communication capacity led to language and a

The Body and the Mind as Roots of Human Creativity

growing vocabulary, and these in turn led to such social inventions as culture, government, and organization. Speech enabled us to transmit past creativity to future generations so that an ever-rising pyramid of inventions has got built up that is available to the entire race.

The third biological apparatus that has stimulated human creativity is, of course, the brain.<sup>5</sup> We have not only a relatively large brain for our body weight, we also have a more complex brain than other species, including the great apes. We have a relatively outsized and highly differentiated brain structure called the cortex. This cortex is the seat of our intellective activities-recalling, reasoning, analysing, categorizing, associating, weighing and comparing, combining and synthesizing, mentally experimenting, analogizing, visualizing, imagining and dreaming, guessing, intuiting, realizing, aspiring, evaluating, and so forth. The differentiation of the cortex into relatively specialized halves-the left and the right hemispheres-has enormously increased these capacities. In right-handed humans, the left hemisphere specializes in vocalising, analysing, reasoning, categorizing, etc., while the right hemisphere specialises in integrating, contextualizing, intuiting, visualizing and so forth<sup>6</sup> (See box on *Brain Laterality and Creativity*). At the same time, these hemispheres do not operate in isolation. They are connected by the cable of 200 million strong nerve fibres called the corpus callosum along which left hemisphere mentation travels to the right hemisphere and vice versa. Each time a message goes from one hemisphere to the other, it is modified by the mechanisms of the latter. For instance, an analysis of a situation, such as an unexpected guest, by the left hemisphere is contextualized by the right hemisphere in terms of social norms for treating guests, considerations of future reciprocity and so forth, so that the person's response is 'wiser' than it would be if just the left hemisphere had its way. Arthur Koestler has talked of creativity as the fusion of two previously unrelated frames of reference.<sup>7</sup> That is precisely the capacity built into the brain by hemispheric specialization and integration. There is also a suggestion that the prefrontal lobe of our brain that governs will and volition also plays a role in creativity.<sup>8</sup> Creativity, after all, is not random play; it is purposive and can be stressful. Will is needed to release its potential. Indeed, Howard Gardner has argued that all parts of the brain-left as well as right hemispheres, front (prefontal lobe) as well as the back of the brain (temporal lobe), the cortex as well as the limbic system and other components lower down in the brain-provide the multiple intelligences needed to be synchronized for creativity.<sup>9</sup> So, we have a species that has been fortunate enough to have three organs that separately and in combination endowed us with a superior capacity for creativity. No wonder then that *Planet of the Apes* is our creation, not of the apes!

#### **Human Biology and Creativity**

From time to time, scholars have sought to explain the enormous differences in creativity and other achievements within our species in terms of such biological variables as race, heredity, and sex. Francis Galton, a British scientist of the 19<sup>th</sup> century, concluded from his study of geniuses, that genius, in any given society, is hereditary.<sup>14</sup> He examined the family lines of famous men of

#### **Brain Laterality and Creativity**

Early in the 1950s, Ronald Myers and R.W. Sperry, then at the University of Chicago, discovered that when the connection of tissues and fibres between the left and right hemispheres of the brain, called the corpus callosum, was cut, each half of the brain functioned more or less autonomously.<sup>10</sup> Later work indicated that each half of the brain specializes in certain cognitive functions. This specialization has come to be known as laterality. In right-handed persons, the left hemisphere has been found to be dominant, controling such functions as speech, categorization, analysis, step-by-step linear thinking, sequencing, timing, etc. In right-handed persons, the right hemisphere has been attributed such cognitive functions as synthesis, space arrangement, wholeness of perception, pattern recognition, sense of timelessness, etc. <sup>11</sup> The two cooperate, through the corpus callosum, to provide us with a richly textured perceptual as well as analytical and integrated thinking capacity.

Where does creativity come into the picture? Itzhak Harpaz has summarized the prevailing view thus: "Although there is agreement that creativity can originate in both hemispheres, or that it requires an interaction between the two...the literature dealing with brain asymmetry and creativity assumes that the source of creative behaviour is in the right hemisphere."<sup>12</sup>

Harpaz tried to test this assumption with the help of 119 right-handed undergraduate students in economics and accounting and 65 undergraduates in the creative arts department in Israel. Several 'left hemisphere' tests, involving familiar sounds like those of trumpet, rooster, boat, horn, baby's cry, song, bell, etc. and randomly announced digits, were administered to both groups. The subjects were asked to recall the sequences of the sounds and random digits. Similarly, several 'right-hemisphere' tests were also administered involving spatial orientation (such as of geometrical shapes) and recognition of non-temporal patterns. All the subjects were given several tests of divergent thinking and a test of brain laterality called Cognitive Laterality Quotient that measures the extent of dominance of one hemisphere over the other.
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The findings were interesting. Out of five divergent thinking tests, for which statistically significant results were obtained, the scores of four were correlated significantly with right hemisphere dominance, while only one was significantly correlated with left hemisphere dominance. Secondly, the arts students showed a significantly higher right brain dominance compared to the economics/accountancy students. Clearly, divergent thinking is more strongly associated with the right brain hemisphere specializing in pattern recognition and holistic thinking than in the left brain hemisphere specializing in logical, sequential thinking; and artists think very differently from accountants and analysts. Indeed, their interests may also differ. As Donald MacKinnon summerized the results of extensive research on different groups of people, "...original and creative subjects have interests similar to those of psychologists, author-journalists, lawyers, architects, artists, and musicians, and unlike those of purchasing agents, office men, bankers, farmers, carpenters, veterinarians, and...policemen and morticians...creative persons are relatively uninterested in small details, or in facts for their own sake, and more concerned with their meanings and implications, ..... interested in communicating with others,...and relatively disinterested in policing either their own impulses and images or those of others."13

Lord Snow talked of the divide been the culture of art and the culture of science. The divide between the right- and the left-brainers may be wider.

science, literature, music, politics, law, armed forces, art, and spirituality. He found a large percentage of the 'geniuses' he studied had distinguished sires, sons, and other close relatives. Among close relatives, the percentages of distinguished sires and sons were higher than the percentages of uncles, nephews, grandfathers, or grandsons. Thus, the shorter the genetic distance from a 'genius', the greater the probability of the relative being also a 'genius'. As an example, Charles Darwin, the author of the revolutionary *Origin of Species*, was a paternal grandson of Erasmus Darwin, a poet and a scientist, and a maternal grandson of Josiah Wedgwood, a famous potter. Charles Darwin's famous progeny included George, an astronomer and mathematician; Horace, a civil engineer; Francis, a botanist; and Leonard, an economist, engineer, and eugenicist. (Eugenics is the science of breeding for improving quality.) Darwin's grandson George was a physicist. Francis Galton himself was a cousin of Charles Darwin. It is, however, still unclear whether, or rather to what extent, 'genius' is concentrated in eminent

families because of genetic factors or because of the culture of these families, especially the freedom and encouragement given to children to explore and make a distinctive contribution (See box on *Darwinian Creativity*).

## **MENTAL ROOTS OF CREATIVITY**

Human consciousness is multi-layered. There is our normal, waking consciousness. But there are sub-conscious caverns in which all sorts of emotions and ideas and intuitions ferment without our

### **Darwinian Creativity**

Biological evolution can be said to be a form of creativity, for it has resulted in hundreds of thousands of species from the original life form that appeared on earth about 3500 million years ago. How does nature's creativity work? Apparently, by random mutation and the propagation of those mutants with survival strength. This was Charles Darwin's great insight.<sup>15</sup> Some students of creativity have adopted the Darwinian model to explain human creativity. Human beings are believed to be the most creative species of all. They survived and prospered because their creativity-in tool making, in magical art, in organizing a governance structure, in evolving speech, and later in writing-gave them a survival edge over the other creatures of the wilderness. Donald Campbell has argued that the human creative process itself has Darwinian features—trial and error or 'blind' generation of many ideas and variants in response to a problem situation, analogous to mutation; selection of a viable solution from among these ideas; and mechanisms, such as memory, through which the selected idea is preserved and repeatedly utilized as per the need.<sup>16</sup> Thanks to language, creations are preserved in human cultures and diffused from person to person and culture to culture, further distancing humans from all other species, and elevating some cultures over others. In his study of 'genius'-defined as ability to make pathbreaking discoveries and innovations that receive acceptance and acclaim over time-Dean Keith Simonton, a student of creativity in different ages and occupations, has proposed that essentially a Darwinian process as adapted by Campbell operates to generate many minor innovations. In turn, these create a platform of technical know-how, and a gifted individual (a 'genius')

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comes along—such as Newton or Einstein—who climbs on the shoulders of relatively minor creators and achieves a breakthrough.<sup>17</sup>

The Darwinian model of creativity is simple and elegant. In association with the intellectual and other skills of humans, it has been utilized to explain why advances in most technological and artistic fields are authored by a tiny minority of creators.<sup>18</sup> But the model may be too simple. It does not give due weight to human motivation—the passionate commitment to discover and invent that we find so often in creators. Nor does it take enough cognizance of purposiveness in so-called 'blind' or trial-and-error thinking. As Robert Sternberg has put it, "...cognitive mechanisms in human creativity are, for the most part, sighted rather than blind".<sup>19</sup> As he further writes, "Far from varying ideas blindly, many creative people use both formal and informal knowledge bases in order to generate ideas that they believe or at least hope will be well received....".<sup>20</sup> There is a huge difference between random mutations and the wild and chaotic (but directed) brainstorming involved in the creative process. Nor does it explain why creators often choose solutions for aesthetic, moral, altruistic, or ideological rather than survival or selfish reasons.

We may need to recast our notions about evolution as it concerns human beings. Ours is more a 'memetic' evolution than a Darwinian one—an evolution based on memes, that is, ideas, beliefs, perceptions, and experiences. Such an evolution is powered not just by competition but also by cooperation. Darwinian evolution is survival-oriented, with 'unfit' species dying out and 'fit' species surviving and multiplying. Instead, memetic evolution is proliferation-oriented, with memes surviving and instigating other memes, and combining in many different ways to produce new memes. Darwinian evolution is blind; memetic evolution is substantially purposive, driven by people's goals and wishes and viewpoints. Darwinian evolution is extremely slow; memetic evolution can be superfast, leading, in some societies during certain ages, to a doubling of knowledge virtually every generation. We are rapidly reaching a situation where every one of the billions of humans on this planet will be able to interact with the rest. The implications of this connectivity for human creativity are mind-blowing. It may forge a collective mind that is exceptionally differentiated and equally exceptionally integrated, much in the way our brain is, and so, capable of limitless creativity in all its tulip colours.

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being 'conscious' of them. Let us examine how creativity may be distilled in these caverns and frequently explode into our normal consciousness as an 'aha' experience.

#### **Subconscious Roots of Creativity**

Several thinkers have tried their hand at providing mental explanations of our creativity. Some like Sigmund Freud and the followers of psychoanalysis have sought its roots in the dark recesses of the subconscious mind. According to this view, the human psyche is perpetually caught in the crossfire between the compulsions of its wilder impulses and the compulsions of its conscience. This is a highly creative conflict, for it forces us to invent symbols and other subterfuges for having our cake and eating it too–gratify our instincts but in a manner that does not violate our conscience. To caricature Freud, a writer lusting after his mother and wanting to eliminate his father (main rival for the tendernesses of the mother) may write a play such as *Oedipus Rex* in which he kills his father and marries his mother–by accident, of course! Feelings of guilt may lead to sublimation–the pursuit of noble callings like those of the surgeon and the cop–to camouflage murderous proclivities. In this perspective, creativity is largely a camouflage, a temporary reprieve from the pressures on the psyche.

Even within the ranks of psychoanalysts, there have been voices of protest against this oversimplified view of creativity. Freud himself made a distinction between neurosis and art, and indeed admitted that psychoanalysis may explain some of the motivation for creativity but not the magic of creativity.<sup>21</sup> He was forthright in admitting that psychoanalysis can do nothing towards explaining the artistic gift or the means by which the artist creates. Some psychoanalysts differentiated between primary, reverie-like, stream-of-consciousness thinking, and the secondary thinking processes of evaluation, purposiveness, choice, refinement, and control.<sup>22</sup> Some others differentiated between unconscious and pre-conscious mental functioning, the unconscious consisting of our wilder impulses, and the pre-conscious consisting of analogies, memories, and playful, trial-and-error thinking. Ernst Kris, for example, suggested that it is the pre-conscious mind that plays a vital role in creativity, by thinking up a number of options, including some novel ones.<sup>23</sup> Though what we consider pathology may be an adjunct of creativity, the creator's 'ability to give his fantasies body, form, and structure-that is, his use of pre-conscious and secondary processes-prevents domination by so-called pathology.<sup>24</sup> Indeed, the creative process is orchestrated by the 'ego', that is, by the choosing, adjusting, controlling mechanism of our psyche, and this ego may permit the mind to slip into reverie-like and playful states from the normal evaluative-logical- state of consciousness in order to locate creative, off-beat solutions.25

Alfred Adler and Carl Gustav Jung, both disciples of Freud who later broke ties with him, came up with their own explanations of creativity. Adler spoke of the inferiority complex that afflicts us. Creativity is a way of compensating for feelings of inferiority.<sup>26</sup> Jung noticed the divine discontent

some of his patients exhibited—a restlessness and a sense of depression the gifted frequently suffer from. According to Jung, the human race has a collective unconscious in which archetypal shadows lurk.<sup>27</sup> These archetypes are the primal, shared experiences of mankind. They include the 'persona', the social mask people wear; 'anima', or the feminine side of man's nature, and 'animus', the masculine side of woman's nature; 'shadow', man's inherited animal instincts, or the animal side of the human psyche; and 'self', or the individual's striving for completeness, the centre itself of the psyche, whose development is life's goal. Human creativity is accessing and expressing—in infinitely varied ways—these potent but shadowy archetypes. The gifted among us may be more in touch with these archetypes than ordinary mortals, but their uneasiness may spring from a feeling of being blocked in expressing the powerful but inchoate visions they are sensing. Creativity and exhilaration follow the successful visioning and interpretation of an archetype in art or science. Thus, the creative process is the struggle to express the archetype lurking in the unconscious mind.

And yet, the conscious and the unconscious should not be distinguished too much. They are two sides of the same coin. As Rudolf Arnheim has put it, "…in the creative process, conscious behaviour and unconscious behaviour are no more different from each other than the flowing of a river in full daylight is different from its flowing in the darkness of the night."<sup>28</sup>

#### **Closure Need and Creativity**

Human beings tend to seek closures of situations. They tend to be uncomfortable with gaps in knowledge or understanding, anomalies, contradictions, or situations left hanging. They have a need for coherence. Creativity arises in the pursuit of coherence. When there are no satisfactory answers to 'why', 'what', 'how', 'when', or 'where', the human mind often goes into a problem-solving overdrive. Solving puzzles is both vexing and pleasurable, an activity in which millions engage when trying to second-guess detective stories and mystery novels, and trying to solve crossword puzzles. This puzzle-solving obsession also launches large scientific, technological, and artistic efforts at deciphering nature in its manifold forms, efforts that frequently culminate into such creative outcomes as discoveries, inventions, new forms, new applications, and new interpretations.

There is another gap that also frequently stimulates creativity—the gap between what is and what ought to be. We are an aspiring species. We aspire to achieve goals and states. Often, we convert aspirations into necessities, and necessity, it is said, is the mother of inventions. We also have aspirations about the eternal verities—the good, the true, and the beautiful. Our creative effort, as a race, is as varied and as deep as our goals, needs, and norms. Gestalt psychologists have argued that the perception of the goal situation "provides the tension between what is and what should be, and aroused by this tension, the energy necessary for the effort of thinking."<sup>29</sup>

Gaps are not static. They can get redefined. Such redefinitions are particularly powerful for 'productive', that is, creative thinking, and frequently yield the 'aha' kinds of wondrous insights or solutions. For instance, all these years the attempts to cure (or contain) cancer revolved around strategies for killing rogue cells. Now it turns out that cells in any case are programmed to die, but do not if master cells called MYC cells contradict the programmed demise by sending a message not to destruct. Thus, new cures would tend to be invented, which could involve preventing the master cells from vetoing the built-in self-destruction. Thus, the problem has been redefined by these researchers from killing rogue cells to how to allow them to die their natural deaths.

Questions are a response to perceived gaps. Questions bring problems alive. Questions, as someone has said, are the creative acts of intelligence, for they can push intelligence into previously uncharted terrains. As Mary Henle has put it, "… posing the right question may be the most creative part of the whole process", by which creative solutions are found or creative work is performed.<sup>30</sup> James Stephens graphically put it, "A well-packed question carries its answers on its back as a snail carries its shell."<sup>31</sup>

Asking a good question is an art, for it prioritizes the knowledge that is needed, and focuses the search more sharply. A creative question not only does this, it also alters the strategy of finding a solution from an overused or unproductive earlier strategy. Why people engage in customary rituals is a good sociological question, because it draws attention to the functions rituals perform in a society, the human needs or concerns that are met by rituals, pressures for conformity, types of rituals, their costs and benefits, etc. But somebody could ask an even more provocative question: "Why **don't** some people practice such rituals?" This one can lead to many fruitful, new enquiries, such as about why some humans rebel, how people assess the risks of non-compliance of social conventions, and how social norms change because of the non-compliance by a minority.

The art of asking good questions, especially creative ones, often draws on two capabilities. The first is a reasonable depth of knowledge about the field in question, so that the person is aware of what is known and also what is unknown. As Wolfgang Kohler, a renowned Gestalt psychologist put it, "…problems issue from knowledge."<sup>32</sup>

The second is a healthy curiosity about why matters are the way they are, and also why they are not the way they should be.

An acute awareness of the situations in which problems arise, especially an awareness of contradictions, negative instances, unpredicted and odd occurrences, incompatible theories, and so forth is powerful fuel for propelling creative questions. In conformist societies, such oddities are brushed aside or explained away. In many traditional communities in India, for instance, the oddity of poverty amidst plenty, why some starve while some others fatten on rich food and luxurious living, is commonly explained away through the *karma* theory–the starving are

suffering because of the bad deeds they did in their past lives, while the rich are enjoying themselves because of their past good deeds. Nothing, therefore, needs to be done by the poor except endlessly reciting God's name! But in renaissance societies, questioning the status quo carries no severe sanctions, and every field turns into an intellectual fireworks. These are dialectical societies delighting in endless cycles of questions, answers, and more questions. Not that in such societies everyone is equally good at such dialectics. Rigid beliefs and biases, ideological over-commitments, unexamined assumptions, too limited conceptual ability or theoretical perspective, and low curiosity or motivation to probe take their toll, and frequently dialectical enquiries degenerate into dialectical fights in which heat eclipses light.

A particularly productive way of pursuing an enquiry is to frame a specific issue in a broader context. For then, any answers we get would have implications not just for the issue at hand, but for the whole broader context. For instance, suppose there is concern about the water-logging that a specific canal has created over the years, and the question therefore is, how can it be prevented, eliminated, or reduced. Various solutions may be found, such as lining the canal with non-porous plastic or concrete or a better drainage system. These may be good solutions for a particular problem, but may not be such good solutions in an overall context. If the larger context, namely the optimal use of a whole region's hydro resources, is kept in view, the solutions could be evaluated for application vis-à-vis other canals, rivers, lakes, and so forth in the region. Creative solutions could emerge, such as connecting up all the waterways and water bodies for better drainage, as well as for optimizing on irrigation, water transport, hydroelectric power, fisheries, vacationing facilities and water sports, and of course reducing the damage due to water-logging.

Posing a paradox can be another way of framing a question that can instigate creative enquiries. Why all this poverty amidst so much plenty, why some people smoke or drink themselves to death even when they love living, why powerful empires break up, why close relatives frequently harbour love-hate feelings for one another, why docile people love violence on the television, why mutation stops in some species but not in others, how come some economies experience both stagnation and inflation ('stagflation'), how come the US-the world's most affluent nation- is also the world's most indebted, how come twins can differ so much, how come highly intelligent persons (those with high IQ scores) are frequently not creative, why do some birds migrate long distances but others in the same region stay put, how come some species (man, for instance) evolve so much and so quickly while others like the crocodile and the coelacanth fish haven't changed for hundreds of millions of years, how come the earth is hotter inside than on the outside, and so forth. A paradox is a brain-teaser. It has a huge capacity to energize problem solving that can result in creative solutions or insights.

#### **Dialectical Sources of Creativity**

Another interesting root of human creativity is the urge to synthesize previously antagonistic perspectives into a new, integrated perspective. The German philosopher Hegel argued that spiritual advance takes place when a thesis and its antithesis are resolved productively. As Albert Hofstadter has explained, Hegel's 'dialectical phenomenology' involves a "life-affirming response in and through the process of uncovering, confronting, and productively resolving negation, opposition, and contradiction."<sup>33</sup> The essence of dialectical thinking is "to find in each case what are the oppositions, conflicts, contrasts, contradictions, the otherness, estrangements, alienations, that are possible in the context ...". Equally important is to find the "...notion that unifies them by incorporating and using rather than destroying their tension".<sup>34</sup> Hofstadter has used Hegelian dialectical thinking to suggest how creation takes place.

Central to Hofstadter's argument is the concept of the 'other'. Any entity differentiates itself by contrasting with, or showing its separateness with, the 'other'. Thus, we like to differentiate ourselves from the rest of the animal kingdom by calling ourselves 'human' and the 'other' creatures as beasts. This differentiation is the basis of our identity or 'being'.

'Becoming', on the other hand, and this is the creative process, becomes possible when the 'other' is absorbed into oneself to form a new identity. Thus, the process by which we enlarge our identity by accepting our animal aspects involves a creative redefinition of ourselves. Such a creative enlargement can take place through imagination and emotion.

Imagination, according to the German philosopher Immanuel Kant, is the "power by which the human mind shapes its experienced and experienceable world. The imagination is, as it were, the world-forming faculty of mind."<sup>35</sup> This imagination is not just fantasizing. It is through imagination that we are able to perceive new interpretations and inferences of what we experience, combine them into new insights, meanings, or perspectives, and link them to concrete materials as in art or science or profession. As Shakespeare has put it, imagination bodies forth the forms of things unknown.

Emotion or passion also plays a crucial role in creativity. It "operates like a magnet drawing to itself appropriate material...Selection and organization of material are at once a function and test of the quality of the emotion experienced."<sup>36</sup> Emotion and imagination work together in the creative enlargement of our identity: "Creativity is the happy juncture of need with the imaginative capacity to give shape to the need."<sup>37</sup> But this happy conjunction becomes meaningful when it is appropriate in the given context, and effective when it is executed skillfully. Thus, creativity is a resultant of fusing the existing with the alien through imagination, emotion, context, and skill or mastery.

Hofstadter provides a striking example of his theory of creativity: "...the slab of wood that becomes the threshold of the house begins by being a mere slab of wood, outside the house and

home, a nothingness of mere woody matter.... In the creation of the threshold, the otherness of the wood is exploited – its hardness, rigidity, durability, architectonic possibility – by laying at the foundation of the doorframe, when lo! it becomes the foundation of the place of entering and leaving. The otherness has not been lost; it has been uplifted ...into the reconciliation of belonging in and with the doorframe, itself in and with the walls and roof, and all together with the paths, the streets, the other houses, the inhabitants, the neighbours, in the grand interconnected complex of ownness that is the village".<sup>38</sup>

#### Intuition as a Source of Creativity

Intuition is a more or less correct conclusion reached on the basis of neither conscious logic nor noticeable evidence. Many outstanding creators have attested to the role of intuition in creative achievement.<sup>39</sup> Albert Einstein believed that not logic but intuition assisted by experience leads to the discovery of scientific laws. Federico Ruiz claimed that intuition always precedes reflection, and it operates more rapidly. Henri Poincaré, the mathematician made the point epigrammatically: *it is by logic we prove; it is by intuition we invent.* We think of ourselves as a logical species. We are also an intuiting species. Within us lies in wait the shaman, the artist, and the prophet.

Intuition comes in many types. Premonition is the extrasensory perception (ESP) type of intuition, in which one knows/sees in advance, without evidence or rationale, that an event (often a nasty one, like death or calamity) is going to happen. Another type is guessing repeatedly correctly on very thin basis, as with a lucky gambler or stock investor. In between are what we may call creative intuitions—inspiration, vision, conviction, hunch, law, hypothesis, metaphor—that come almost unbidden, or at least without any strenuous logical or empirical effort, and flag off creative work.

Emma Policastro has thought of creative intuition as a "vague anticipatory perception that orients creative work in a promising direction, and also a tacit form of knowledge that broadly constrains the creative search by setting its preliminary scope".<sup>40</sup> Thus, creative intuition is a stimulating pointer, an initial awareness, and a scope-fixing device for creative work. But it is not only this. Creative intuition unfolds over time into a more and more conscious undertaking. Creative processes are triggered by 'generative' or creative intuitions and after much persistent effort, culminate into more clearly perceived forms. As Gruber has noted in his study of Darwin, it took a long time for Darwin to become aware of ideas, such as the idea of natural selection, that were already implicit in his thinking.<sup>41</sup>

Can intuitiveness be measured? Apparently yes, and in quite interesting ways. Based on Carl Jung's ideas, a psychometric instrument has been devised, called the MBTI or Myers-Briggs Type Indicator, that can identify intuitive types of persons, that is, persons oriented to future possibilities and to perceiving unfamiliar patterns.<sup>42</sup> Studies on a variety of highly creative persons

such as mathematicians, scientists, writers, architects, visual artists, composers and so forth indicate the predominance of intuitive types amongst these. In the general population, one in three may be an intuitive type. Well over two-thirds of the highly creative persons tend to be intuitive types.<sup>43</sup>

K.S. Bowers and associates have used some ingenious ways of measuring the intuitive ability of people.<sup>44</sup> In one version, two sets of cue words are provided to the subject. One set fits well with an undisclosed word; the other set does not. The subject is asked to guess what the undisclosed word is. For example, one set of words consists of 'playing', 'credit', and 'report', while the other set consists of 'still', 'pages', and 'music'. The word 'card' fits well with all the three stimulus words of the first set but not at all with those of the second set. If the subject guesses right, that is 'card', he or she scores a point. Several such dual sets of cue words are provided to compute the intuitiveness score.

In another version, a number of cue words are presented to the subject one after another, and the subject is asked to guess the undisclosed word for which these are cues. The cue number at which the subject is able to make the correct guess represents the subject's intuitiveness score – the earlier the number, the higher the score. Suppose, for example, that I give the following 10 clues, one after another: (1) grass, (2) skin, (3) curve, (4) liquid, (5) bounce, (6) fans, (7) stadium, (8) contest, (9) kick, and (10) goal. Practically everyone would get 'football' at the end of the 10<sup>th</sup> clue; but many may get it well before this. In several such exercises, if someone keeps getting the correct word fairly early, he/she may have relatively high intuitive ability.

Can intuitive ability be developed? Possibly. Respecting one's inner promptings–rather than suppressing them as irrational– may be one way of strengthening intuition.<sup>45</sup> Meditation may be another. It calms the mind and mutes the clatter of concerns, and thereby lets weak, intuitive signals rise to consciousness. Learning to associate intuition with a colour or form can help in recognizing it. Requesting the mind for intuition and thanking it when you get a genuine, useful intuition may also help in developing intuitive ability. Dreams can be a source of intuitions. Research on dreams suggests that if people form the habit of jotting down details of a dream they can remember, they can remember more and more of their dreams, and may stumble upon what a dream is trying to tell them.<sup>46</sup> As Kahlil Gibran has put it, "trust the dreams, for in them is hidden the gate to eternity".

Insight and intuition may be closely related. Insight is usually a flash of clear comprehension; intuition may frequently be its precursor. It tends to be vaguer, more of a pointer than a clear solution. It serves to cultivate intuition—and intuitive persons. Creative insights may then become more accessible.

## **CONCLUDING COMMENTS**

Nature has conspired to implant in us a huge creative capability. But it has also implanted in us a huge destructive capability. A biologist has suggested that we have a triune brain—a consequence of our reptilian, mammalian, and hominid heritage.<sup>47</sup> Nature has done what it could, and turned us into an explosive species. Now we—that is, our collective will and mind—need to take charge, and begin to veer our creativity more and more towards goodness, altruism, and spirituality. These, too, are within us, waiting for a handshake. In the next chapter, we explore the spiritual and social roots of our creativity, the better to be able to harness them.

## Quiz

١.	By increasing the uses of our hands, can we become more creative?
2.	Is it likely that advertising professionals have right brain hemisphere dominance while policemen have left brain hemisphere dominance?
3.	In many fields, a few seem to account for the bulk of innovations. Would this be true of cooking, hair cutting, and teaching?
4.	Are short people more creative than tall people?
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5. Why are questions better at evoking creativity than answers?

- .....
- 6. "Debates are quarrels and quarrels do not lead to creativity." What do you think?

7. Are ambitious persons more creative than laidback persons?

## MENTAL GYM

1. Get hold of a book of puzzles. Every night, read one puzzle carefully. Then, without trying to solve it, go to sleep. When you wake up in the morning, go back to the puzzle. Now try to solve it. Reflect on your experience, and gain insights into how your mind solves problems.

2. The hand may be a major source of human creativity. Take up a hobby—such as pottery or gardening or weaving—in which you use both your hands for creating something. Reflect upon how this hobby affects your mental processes.

3. Once a week, get together with friends and relatives to share your intuitions, dreams, and insights.

- 4. Try meditation; Transcendental Meditation (TM) or any other form will do. Notice how your thinking processes change during meditation. Do you observe any post- meditation effects?

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# 5

# Spiritual and Social Roots of Creativity

Our aggression and sexuality, so necessary for the survival of our species, represent our animal heritage. But we are also human. From times immemorial, we had a conception of afterlife, for we buried our dead and left gifts for them. We also worshipped a greater power than ourselves in innumerable ways, and found ways of getting into calmer, gentler, more cosmic moods<sup>1</sup>. We experienced and talked about truth, beauty, and goodness. Our shared sense of humanity–a form of spirituality–led us to creating such institutions as the family in which the governing ethic was from each according to ability and to each according to need. We could extend this notion of concern, sacrifice, nurturance, protection, and growth of those close to us to

more remote relatives, community members, and to some extent also to society and even all living creatures. We are a nasty and destructive species but we are also a nice species. Our creativity reflects fully our dual, schizoid nature. In this chapter, let us explore the spiritual and social roots of our creativity. A better understanding of these roots may help us design a more benign ecology for our creativity, with beneficial consequences for our species, and possibly for all species..

There is one spectacle grander than the sky, and that is the interior of the soul Victor Hugo

## **SPIRITUAL ROOTS OF CREATIVITY**

### Variety of Spiritual Creativity

Can the human's nobler impulses be a source of creativity? These nobler impulses include the quest for the divine; a sense of human brotherhood and sisterhood; altruism or doing good for others without an expectation of reward; a deeply moral sense of right and wrong, and good and bad; love of humanity and indeed of all living beings; and plain goodness and helpfulness. For me these, rather than any formal religious affiliation, define our spiritual impulses.

Any aspiration that is difficult to attain will incite human ingenuity. The spiritual quest, so difficult to pursue in a nasty external world crafted by greed, and in an equally nasty internal world crafted by our own selfishness, egotism, sensuality, and aggressiveness, therefore should incite creativity, if it is strong enough. Indeed, spiritual creativity seems extensive and has taken many forms-new religions; ethics; humanistic ideologies; altruistic practices; spiritual art and literature; caring, 'socially relevant' science and technology; paths of salvation; charities; welfare legislation; programmes of alleviation of the sufferings of the poor, the handicapped, the disadvantaged, and the scorned; movements of emancipation of the enslaved and the oppressed; the green movement; conservation of endangered species; culturally invented ways of socializing children into morality, citizenship, and goodness. Freud would call all these the labours of the superego, and sublimations of our dark impulses. Maslow would call these the essence of what it is to be human. Gandhi, Jesus, Buddha, Confucius, Socrates, and Mohammed would describe these as the manifestations of goodness and morality.

The spiritual quest is inherently creative. There is no well-traversed, unfailing road to spirituality. On the contrary, every path to spirituality is paved with frequent falls of flesh and occasional leaps of spirit. It is usually the road less travelled, and indeed, most often it is a self-made new path through the thickets. If one is lucky to find a capable preceptor, the path is less thorny.

### **Spiritual Fraternity and Creativity**

There is some evidence that forms of yoga, likeTM, taught by a trained guru, increase our creativity when practised long enough.<sup>2</sup> But there is another important way the spiritual quest yields creativity. After all, spirituality is the experience of the immanence within all life of the All. In this experience, quite naturally the relationship between us and other living entities— other people, for instance—gets transformed, from an exploitative 'I-It' to a mutualist 'I –Thou'. Some amazing things happen when this transformation takes place. People find lifelong missions. Groups of people come together for good and humane deeds, like the green movement,

Spiritual and Social Roots of Creativity



Ramakrishna Mission, Society of Jesus, Moral Re-armament, Sarvodaya, and Swadhyaya. They find a sustained energy for good, constructively creative work that no financial or other incentives can match.

Swadhyaya is a fascinating movement of millions in western India for spirituality that has yielded astonishing social creativity.<sup>3</sup> It was founded by a previously orthodox Brahmin preceptor of Indian spirituality named Pandurang Shastri Athavale, who felt challenged to make the *Gita* a practical guide for living. He himself changed. He shed his Brahminical arrogance. If God is in every person then there could be no jealousy, discrimination or hatred; there could only be love. Many of his followers have grasped this idea. They go into villages and move among the disadvantaged to sing and talk about this brotherhood of love. Millions have been converted. In the Swadhyaya villages that I visited, there was no filth, no crime, no alcoholism, no wife beating, no impoverished, rickety children scurrying around with swollen bellies and glazed eyes, no violence over petty disputes, no grinding poverty, and no caste or religious prejudices. Instead, there was cleanliness, practically universal schooling for children, good health, reasonable comfort, much cooperation, much warmth, and happy sparkle in the eyes of the villagers. Agricultural productivity has risen sharply in Swadhyaya villages, and thousands of wells and other public works have been completed by the rural folk themselves without any funds from the government or other sources.

There is evidence of much social creativity. It is now possible for the so-called untouchables to officiate as priests for marriage purposes. 'Krushibhakti' or devotion through farming has led to collective cultivation of high-quality seeds and plants for distribution to individual farmers. Collective fishing has emerged among the fishing communities, in which a part of the profits is distributed to the needy, not as charity, but as an offering to the divine, that is, with great respect for the needy. A number of places of collective praying and worship have come up that cement community ties. Barren lands have been made green through collective planting of saplings. Institutions have come up for character and knowledge building in young people. Educational, training, and research institutions related to spirituality too, have come up. Most of these are local initiatives that have been launched by the followers of Swadhyaya with the blessings of the founder.

Some social scientists have considered the Swadhyaya Movement an alternative model of socio-economic development. As of the mid-1990s, this movement had an active membership of about 200000 and had impacted some 80000 Indian villages (about a seventh of all of India's villages). I am not aware of any great feats of innovative art or science or technology or philosophy by any individual Swadhyaya follower. But if empowering the poorest people, removal of the fetters of ignorance and prejudice from the most backward people, replacing social disharmony by harmony, squalour by cleanliness and hygiene, grinding, one-meal-a-day poverty by reasonable comfort, misery by happiness–all as a by-product of the quest for collective

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spirituality, and without any government help–cannot be called creativity of a high order, I should stop writing about creativity!

## **SOCIAL ROOTS OF CREATIVITY**

#### Variety of Social Creativity

Societies vary greatly in how tolerant they are of creativity and in the sort of creativity they promote or tolerate. Although the terms 'society' and 'culture' share much of their core meaning, they can differ in their characteristics depending on how they are defined. For my purposes, I will use the terms interchangeably. By society (or culture) I mean a community whose members share to a substantial extent certain values, norms, beliefs, and notions of proper and improper behaviour. There is, of course, more to society (or culture) than these, such as language of communication, meaning systems, rituals, symbols of • virtue and vice, status hierarchies, and so forth, but I will skip these for my analysis.

Civilization is a movement and not a condition, a voyage and not a harbour Arnold Toynbee

To see how creativity is affected by society, it would be useful to develop a typology of societies. Societies may be arrayed along the conservatism–entrepreneurialism continuum and also along the authoritarian–democratic continuum. For simplicity, let us compare and contrast the effects on creativity of conservative versus entrepreneurial societies and authoritarian versus democratic societies. Conservative societies strongly value traditions, well-established norms and belief systems, and tend to attach high risks to initiatives and entrepreneurship. Entrepreneurial societies encourage a lot of questioning of the status quo, and value major new initiatives and entrepreneurial ventures. Authoritarian societies tend to be intolerant of any innovations that challenge the power structure, while democratic societies tend to be far more tolerant of ideological and behavioural diversity.

These 'ideal type' societal forms<sup>4</sup> may breed significantly different quantities and forms of creativity. A **conservative society** presses conformity and conservation hard and therefore restricts creativity to interpretations of the dominant doctrine (see box on *Creativity of Painters in a Conservative Milieu*). The governing rhetoric is: Why change unless there is a dire necessity? Thus, original efforts would tend to be scarce but there could be plenty of commentaries on the classics, and lots of minor variations in the institutionalized arts, crafts, games, professions, businesses, and sciences. Society tends to change incrementally, although even incremental change over a long period could amount to a fairly profound change. The bulk of the creativity is of the form the

### **Creativity of Painters in a Conservative Milieu**

Ron Mudro studied 40 painters of Nathdwara, a religious centre near Udaipur in Western India.<sup>6</sup> By and large, these painters belong to a caste that specializes in traditional religious painting. There is a well-established style. Mudro found that even among these painters, some were more innovative than others. But they innovated within the boundaries of this established style, a picture that is probably as true for other traditional arts in India such as crafts, and folk as well as classical music. What kind of people were these innovators in a traditional genre? Mudro found that they had a stronger self-image and expressed themselves more openly. They did not feel very bound by religious and social taboos or rituals. They also had a more developed sense of personal ethics. They had a richer fantasy life. They worked harder but less regularly.

Japanese call kaizen.<sup>5</sup> The heroes and role models of a conservative society are torchbearers of the prevailing doctrine ('dharma'), and their emulation by the young tends to be the main process of socialization.

An **entrepreneurial society**, on the other hand, is much more tolerant of radical options and breakthroughs, and permits creative destruction.<sup>7</sup> That is, it is tolerant of innovations and changes that render current technologies, businesses, knowledge systems, or belief systems obsolete because of radical new advances. An entrepreneurial society's role models are pioneers, innovators, social reformers, revolutionaries, social critics, and business entrepreneurs. The entrepreneurial society tends to change in gazelle leaps rather than in baby steps. These societies can be highly turbulent. The governing rhetoric is: "Why not?" The government as well as the civil society and the private sector may take on big, risky projects. These are the societies that try to build pyramids, the tallest skyscrapers, and rockets that can take human beings to the planets and the stars. They may try to unravel the human gene, conquer disease and aging, develop and pioneer new technologies, put up the world's biggest plants, harness fusion energy, and evolve new art forms. Most forms of creativity (conceptual, elaborative, communicative, entrepreneurial, etc.) and most fields of creativity (the arts, sciences, professions, businesses) tend to thrive in an entrepreneurial society. Of all the four types of society, the entrepreneurial society may contribute the greatest breakthroughs in various fields.



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Authoritarian societies do not tolerate threats to the power structure. Those changes and innovations that strengthen the power structure are, however, encouraged, and those that do not threaten the power structure may be tolerated. The governing injunction is: "Obey and prosper." Such societies often have small but thriving pockets of 'protest' or clandestine creativity–poets reviling the regime, artists lampooning it or expressing anger at the 'oppressors', revolutionaries concocting ingenious revolts, and so forth. Authoritarian societies often try to erect charismatic role models of rulers by propaganda and censorship of information reaching the people. Inadvertently, however, they frequently promote creative ridicule and creative resistance.

There have been many authoritarian societies. Historically, they far out-number the liberal, 'free' societies. In the 20<sup>th</sup> century, the Fascist regimes of Germany, Italy, and Spain were examples, as were the countries comprising the Soviet empire. Non-autonomous colonies, too, were ruled in an authoritarianian fashion. Some of these authoritarian societies may come up with remarkable inventions in censorship and the security apparatus, military defence, and inventions in systems of surveillance and state propaganda. Many also have clandestine opposition consisting of creative writers, artists, intellectuals, and professionals.

**Democratic societies** subscribe to Mao's slogan (one that he broke viciously once it had served its purpose) of "Let hundred flowers bloom and let hundred schools of thought contend". These are permissive societies that often recognize – and defend – a number of human rights like freedom of belief, freedom of expression, equality before the law, people's say in how the state is run, freedom of assembly and association, freedom of starting and running new organizations, and so forth. In such a society, communicative and altruistic creativities would tend to flourish, and possibly other types of creativity as well. There would tend to be high levels of diversity in all the features of the society, and much experimentation. Creativity in such a society can become a cottage industry. Widespread creativity may, however, well be mostly modest. The governing rhetoric may be: "Let us try it out." The role models may be creative common men or women, resourcefully tinkering with existing things and systems, experimenting, living creatively as Abraham Maslow has visualized, and in the process growing and actualizing their potential.<sup>8</sup>

In the 20<sup>th</sup> century, freedom from imperial rule or foreign domination, emergence of democracy, and of a market economy of purchasing power democracy produced a number of potentially creative societies. This trend has continued in the early 21<sup>st</sup> century. Compared to their past, there seems to be far greater diversity in lifestyles, belief systems, occupations and activities, and far greater experimentation in the arts, crafts, professions, and businesses of these societies. Although examples of breakthrough creativity may still be few and far between, the change and diversity in food, habitat, and dressing, in occupations, leisure and entertainment activities, in literature, in the arts and crafts, in family ties, and so forth is often striking. Contemporary India, Thailand, Japan, Brazil, Turkey, South Africa, Iran, and Israel seem to be examples. Of course, the vestiges of a traditional, conservative past are still strong but the change

No society is likely to resemble exactly any of the four archetypal societies that I have described. In reality, every society is likely to have, at least to a small extent, features of all four archetypal societies. But the proportions may vary. For instance, the early 19th century India was a highly conservative society. There was a rigid status hierarchy, strict religious practices, and stringent norms about what one had to do and what one could not do. For instance, if one was a caste Hindu, one had to obey elders, perform family rituals and ceremonies, observe prescribed fasts and other deprivations, offer worship to the family deity, and so forth. One could not marry outside one's sub-caste, go abroad, or take up an occupation not sanctioned by one's sub-caste (see box on Do Genes Matter in Social Creativity). Even in such a tradition-bound society, some changes began to take place, especially in the latter half of the nineteenth century. Some industrialization was happening. Small Westernized elites were forming in the cities and were agitating for social reform. People had begun to migrate to cities where lifestyles were quite different. But all this change was merely a minor ruffle on a deeply traditional, hide-bound society. On the other side of the spectrum, while the present-day US has its conservatism, especially in its political and economic systems, it is in the main an entrepreneurial society in which many contrary belief systems, values, philosophies of management, behaviours, technologies, scientific theories, and so forth flourish. Many of these are in a perpetual state of hyper-change, often through dialectical processes. New, often novel, 'big' ventures in every field seem to be a taken-for-granted feature of this society.

Figure 5.1 seeks to summarise how much and what sorts of creativities are stimulated by different combinations of society types.

## **Do Genes Matter in Social Creativity?**

Francis Galton's path-breaking work on 'geniuses' indicates that genes may play an important role in creative eminence. He found that eminent persons more frequently had eminent sons or fathers than grandsons or grandfathers.<sup>9</sup> Studies of identical twins suggest that intelligence (IQ) tends to be strongly related to genes, although the evidence for the relationship of genes with various creative abilities is much less clear.<sup>10</sup> Suppose genes do matter for creative achievement, then do some societies suffer because their social organization leads to genetic impoverishment?

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Consider a society, which is fragmented into numerous small communities. Suppose further that there is a virtual taboo on marriage outside one's particular community. Suppose further that marriage practices promote marriage in the same local area (e.g., marriages are confined to the families of the community in the same village or proximate villages). Further suppose that occupation is confined only to the traditional occupation of the community. And now suppose that the aforesaid has been going on for hundreds, perhaps thousands of years. What is likely to happen?

First of all, there would be very considerable in-breeding, so that the gene pool available to any community is likely to get more and more impoverished. Secondly, in a system like this, people's occupation capabilities are likely to get narrower and narrower. Thus, over time, there is a simultaneous, mutually reinforcing emergence of bred as well as trained incapacity. Such a society would become increasingly conservative as a defence mechanism, and resist innovation and 'outside' competition for the same reason. In a turbulent world of competition and technological change, such societies would lag further and further behind, or retreat behind defensive walls, like Myanmar. Is this a reason why tribal societies, and societies with a rigid caste or class system tend to be much poorer than societies with far fewer restrictions on who one can marry, what education one can get, and what occupation one can choose? Is this a reason why the US grew to greater affluence than Europe, and both grew to greater affluence than India or China?

But if so, are there no ways out? Of course there are. One way is social homogenization, as in the Soviet system in which social and gender barriers as well as marriage and occupational taboos were sought to be erased by forceful government action. Contrasting this are more humane ways of creating an egalitarian melting pot that breaks down traditional barriers. A democratic society, which guarantees fundamental rights, is a big boost for freedom of choice. A caring government that funnels spending into better education and health and opportunities for gainful employment of the disadvantaged is another upward shove. Industrialization, urbanization, mass media, and consumerism also erode social taboos. A competitive society respects no artificial barriers to talent. That is why, with the onset of capitalism and democratic government, agrarian Europe, North America, and Japan could emerge as innovative societies. That is why, India too, is gradually becoming a powerhouse of creativity and innovation.

### **Societal Change and Creativity**

Important as the four quadrants of Figure 5.1 are as shapers of creativity, are the movements

Fig. 5. I	Society-Creativity Types
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	Conservative Society	Entrepreneurial Society
	'Dark Age' Creativity	Centrally Directed Renaissance
Authoritarian Society	Incremental, 'permitted' creativity in traditional domains. Myanmar, Taliban Afghanistan, Saudi Arabia are examples.	A great deal of state entrepreneurship (as in the former Soviet Union or China). Frequent breakthrough creativity in domains related to defence, security, and economic development. A fair amount of 'protest' creativity 2
	3	4
	Popular Renaissance	Explosive Renaissance
Democratic Society	Incremental creativity in traditional- as well as in modernization–related domains, as in several newly independent states like India that have embraced democracy and a market economy.	Very widespread creativity in all its forms. Presence of both breakthrough creativity and incremental creativity. The US and Britain are examples.

between the quadrants. Quadrant 1 is a sort of the dark age of creativity and the other three quadrants represent forms of renaissance-centrally directed (Quadrant 2); popular (Quadrant 3); and explosive (Quadrant 4). It is not as if the movement is only out of Quadrant 1. Civilization in many parts of the world has periodically glowed and darkened like the moon, oscillating between a manic state of hyper-creativity to a depressive conformity. Sumer, ancient Greece, the Moghul period in India, the Pharaohnic dynasties of Egypt, all bear the marks of their manic-depressive oscillations. Quadrant 2, 3, and 4 societies can, and frequently have, migrated to Quadrant 1.

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Similarly, migrations can, and have taken place from Quadrant 1 to the other quadrants and also between the latter.

A point worth bearing in mind is that the nature of creativity manifested in a society in a particular quadrant will bear the impression of the sort of creativity institutionalized in the quadrant from which a society has migrated to the former quadrant. This, of course, will be particularly so in the initial phases of such a migration. Thus, when an authoritarian–conservative society (Quadrant 1) opens up through democratization (Quadrant 3) or state entrepreneurship (Quadrant 2), some features of creativity in Quadrant 1 (incremental, 'permitted' creativity in traditional domains) will continue to be important for a while. China has migrated from Quadrant 1 to Quadrant 2. Thus, for a while at least, creativity in the traditional domains (handicrafts, classical music and arts, traditional décor and architecture, etc.) will coexist in a fairly prominent but abating way with the state's breakthrough initiatives in various domains of socio-economic development such as health and education for the masses, rapid industrialization, nuclear and defence technologies, construction of very large dams and other public works, and infrastructure development. Thus, societies migrating from a quadrant to any of the other quadrants, societies we call transitional societies, will tend to exhibit a broader range of creativity than the creativity in the exit or the entry quadrant.

College kids can reveal the dominant traits related to creativity that are reinforced in a society. A study reported in 1976 of over 800 collegians in the US, India, and Hungary makes interesting reading.<sup>11</sup> The US is quintessentially a Quadrant 4 society (democratic-entrepreneurial). Hungary, in the 1970s, was an authoritarian communist country that had migrated from Quadrant 1 to Quadrant 2 (authoritarian-entrepreneurial). India, in the 1970s, was rapidly migrating from Quadrant 1 into a Quadrant 3 society (conservative-democratic) with movement also into Quadrant 2. The kids were asked to provide information about their personal characteristics, ways of thinking, their creative activities, etc. in a 50-item instrument called Something About Myself. The information was aggregated by country; each country was ranked on each of several personality dimensions. The US was top ranked in terms of 'environmental sensitivity' (mostly openness to others), 'self-strength' (self-confidence, resourcefulness, risk taking, organizing capability), and 'intellectuality' (curiosity, challenge taking, imagination, etc.). India topped in 'individuality' (mostly desire to work alone, eccentricity, being a self-starter) and 'artistry' (creation of models, carvings, music, stories, paintings, etc.). Hungary topped in 'initiative' (directing others, assuming leadership in productions/changes). The fit between the personality profiles relating to creativity and the society's categorization seems to be reasonably high.

## **CONCLUDING COMMENTS**

Body, mind, spirit, and society are powerful shapers of our creativity. We need to study their influences more carefully. Then we can, in turn, shape them to facilitate our creativity. Already the human race is into technologies of genetic, mental, social, and even spiritual engineering. Many fear that these may take away human choice and therefore human freedom. But is it beyond us to design technologies that enlarge human creativity, and therefore human choice and freedom? Is it not possible for us to design drugs, thinking techniques, upbringing, education, and governance to increase interactivity within our minds, and indeed, between minds? Is it not possible to orient our minds to benign rather than malignant aims? The way we govern ourselves may be an important factor in whether we, individually and collectively, turn benevolently or malevotently creative.

Ideology and the governance of societies have frequently fused to produce totalitarian states. Many of these have been intolerant, and some even vicious, as in the case of Inquisition-ravaged Spain, Italy, and France, Stalinised Soviet Union, Hitlerite Germany, and Taliban-ravaged Afghanistan. In our species, killing and cruelty in the name of God or an idealogy comes rather freely. A totalitarian state can be a calamity for creativity. But a spiritual society without a totalitarian state can be a boon to creativity, especially when the state is a liberal, caring, democratic state overseeing a market economy. Many countries now have a democratic state and a market economy. But a spiritual society? That may be a long way off. We need to look at the way we bring up children, the way they get educated, the kind of entertainment they get, and the role models that are promoted for them. Are humane values promoted in all of these, or self-centredness, greed, and violence? Contemporary media, especially messages originating in the US or in their imitation, tilt far towards sex, violence, and greed. That is not a diet to nourish a humane society. Humane upbringing, education, entertainment, and careers are certainly not beyond human ingenuity.

In the next two chapters, we take a closer look at six different forms of creativity. These are basic forms that combine in various ways to produce creative outcomes or products.

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Quiz	

- How has religion restricted creativity? How has it stimulated it?
  Can democracy impede creativity?
- 3. How does a market economy affect artistic, scientific, business, and spiritual creativities?

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## MENTAL GYM

1. Take a good look at the community you consider yourself to be a member of. Do its norms and practices support creativity? List five ways in which you can help your community become more supportive of creativity.

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2. Introspect on your own 'spiritual' impulses. How have you utilized them in your creativity? Identify five new ways of utilizing them.

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# 6

# Essence, Elaborative, and Expressive Creativities



## **ESSENCE CREATIVITY**

Essence creativity is distilled creativity—the heart made visible, so to speak, of the matter. It is laden with meaning and expressed compactly. It can take several forms—a fresh idea or concept or definition, a novel viewpoint or interpretation, a novel relationship, a new law or a novel hypothesis or generalization, or fresh wisdom, such as an intriguing but insightful proverb or quote.

Let us first probe essence creativity in the field of creativity.<sup>1</sup> Earlier, people thought of creativity as divine in nature. Now the notion is that creativity is a very human and widely

distributed ability. It is now defined to be an outcome of effort that is **both** novel and appropriate to the context of the effort. An interesting viewpoint, based on numerous studies of creative people (especially writers and artists) is that creativity is productive insanity. The notion that creativity comes in different forms—each a product of distinctive

Truth has now become an angle, a point of view William Faulkener

contexts, personality traits, cognitive processes, and mental giftedness—is also interesting. The notion that it can be graded from modest to exceptional is another interesting insight. There are several insightful generalizations about creativity: Koestler's hypothesis that all creativity arises from 'bisociation', that is by bridging two previously separate frames of reference;<sup>2</sup> or Teresa Amabile's notion that incentives erode creativity;<sup>3</sup> or Alex Osborn's insight that creative ideation is maximized when evaluation of the ideas is deferred.<sup>4</sup> Several proverbs capture some of the wisdom about creativity. *Necessity is the mother of invention. No risk, no gain. The early bird catches the worm. Variety is the spice of life.* There are several quotes, too, that capture some of the essence of creativity. For instance, Whitney Griswold said that the only sure weapon against bad ideas is better ideas. Jacques Maritain opined that a single idea, if it is right, saves us the labour of an infinity of experiences. Charles Kettering commented that where there is an open mind there will always be a frontier. Mathew Arnolds believed that for creating a master work, two powers must concur—the power of the man and the power of the moment. Edison held the view that invention is 1% inspiration and 99% perspiration. Finally, F. Scott Fitzgerald's view was that the test of a first–rate intelligence is its ability to function with two contrary ideas.

There are many other examples of essence creativity. Freud's interpretation of fluid, chaotic dreams as rational, though crypted, expressions of inner tensions was a novel interpretation. In recent decades, the hitching of human fate to the environment has been a fresh linkage. Many new sciences have emerged by synthesizing different sciences, such as the synthesis of sociology and psychology into social psychology. Poets often relate two distinctive frames of reference to create a multi–level meaning, as in Stephen Spender's phrase pregnant with meanings: "A language of flesh and roses...". Archimedes' discovery of the law of floating bodies in a bath–tub is a wonderful example of a creative discovery. And so on...

Origins of essence creativity often have a lightning–like quality. 'Leap', 'brainwave', 'illumination', 'revelation' are the metaphors that come to mind when we think of the insights that power essence creativity. There is an enormous compression of thought, or distillation of essence, or discarding of chaff to get at the grain.

From where does essence creativity arrive? It seems to be powered by insights. Essence creativity is a bridge between the new and the known, and insights are the bricks of this bridge. Insights are often characterized by suddenness, brevity, and luminosity.

Insights are commonplace. Wolfgang Kohler, a pioneering Gestalt psychologist, thought of insights in terms of a directly perceived adequate cause of any phenomenon.<sup>5</sup> If one catches cold, the person may attribute it to eating ice–cream during cold weather, rather than to the cup in which the ice–cream was eaten, or the face of the ice–cream vendor. So, to Kohler, this ability to weed out from a plethora of possibilities the most plausible cause was insight. But he pointed out that insight was the result of a dynamic interaction between the person and the situation. In this interaction, the person selectively linked elements of the environment with the change in the

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person's belief, perception, or feeling. As he put it, "...insight refers to experienced dynamics in the emotional and motivational fields no less than to experienced determination in intellectual situations..."<sup>6</sup> Such insights frequently restructure a problem situation. After an insight the situation seems different, and therefore its solution also changes, usually for the better.

Kohler discussed commonplace insights. Creative insights, however, are extraordinary.<sup>7</sup> Creative insights illuminate. They light up the unknown or under–known kernel of phenomena. Indeed, one measure of how sharp an insight is, is the ratio of what we know about a situation or phenomenon **after** the insight to what we knew about the situation or phenomenon **before** the insight. The higher this ratio, the more creative is the insight.

Insights are most commonly pursued by persistently asking questions. Rudyard Kipling has rhymed:

I keep six honest serving-men They taught me all I know Their names are What and Why and When And How and Where and Who.

Questions are focusing and mobilizing devices. They get the mind to focus sharply and actively; and they mobilize the huge and variegated resources of the mind, such as memories, associations, relevant analytical categories, store of similarities, information, expertise, feelings, contexts, logic, imagination, etc. The resulting build–up of tension, excitement, and turbulence in the mind can precipitate an insight–an aha experience–that discharges the tension, like lightning discharging the build up of negative and positive charges. What earlier was disjoint is now connected. What earlier was a mental barrier is now a channel along which thoughts can course freely.

Certain other mental habits may facilitate essence creativity. A persistent quest for the principles of things—be they society, machine, or family—can yield plausible revelations; some of these can be creative. A debating or dialectical mind that is receptive to, indeed, looks for, antitheses to received wisdom is more likely to stumble upon a creative synthesis type of essence creativity than a closed, single–track mind. Albert Rothenberg found just such a dialectical mind at work in his study of 22 scientists who were all Nobel laureates.<sup>8</sup> A mind that keeps looking for gaps, the unexplained, the contradictory, the anomalous, the odd – even in well–established dogmas—is a likely receptacle of essence creativity. It helps to read widely, to expose oneself to many fields and many different views. Subtle combinations of previously unrelated ideas may precipitate fresh ideas. People commonly look for their kind for making friends. There is more comfort this way, but usually little growth or stimulation. Diverse associations can instigate essence creativity. Be it noted that in inventing *satyagraha*, the instrument for overcoming untruth by truth, hatred by love, violence by non–violence, *Gandhiji* considered people as diverse as the

novelist Tolstoy, the philosopher Emerson, and a Jain monk Shrimad Rajchandra, as his gurus. Ability to shift mental gears and see issues from entirely different perspectives may also yield essence creativity. Doctors usually prescribe antibiotics to fight infection. But antibiotics often have negative side effects, and after repeated usage, people frequently develop an immunity to them. On the other hand, the body has a built–in ability to fight disease. If doctors could shift from trying to kill infection through antibiotics to strengthening the body's capacity to fight disease, breakthroughs in treatment could result.

Insights are the raw materials of essence creativity. Much work needs to be done to hone them into useable creations. This means contextualizing them for greater relevance; sharing them with others for comments and suggestions; baking them in the heat of reason to burn off fluff; and testing them out. At the end of all these processes may stand luminous the figure of essence creativity.

What kinds of contexts and what kinds of persons evolve essence creativity? New fields, hybrid fields, or re-defined fields are likely to be the nurseries of creative questions, observations, insights, and essences. They tend to be rife with controversies, paradoxes, and major gaps in understanding field-related phenomena. The unknown, the unfamiliar, the strange, and the mysterious wave a red flag for pioneering and insightful excursions, many of which may result in essence creativity.

Two fields, one quite old and the other relatively recent, demonstrate how thick and fast essence creativity is flowing in them. The first is astronomy, a field that is as old as human civilization, but one that has been repeatedly redefined by discoveries. The second field is the study of human organizations, barely a hundred years old as a field of investigation, and one that also has been redefined repeatedly because of hybridization with social sciences and humanities.

Consider the way astronomy has been impacted by new ideas and discoveries: the sheer size of the universe (billions of galaxies, each containing billions of stars); the 'big bang' which gave rise to the present creation; different types of galaxies (including the quasars), different kinds of stars, different lifecycles of different kinds of stars, with massive stars exploding into supernovas and collapsing into super dense bodies or even 'black holes'; the existence of dark matter and anti-matter; the existence of planetary systems in nearby stars, suggesting that our system of a star surrounded by several planets may not be an aberration but probably is the rule; fairly widespread building blocks of life floating around in space, such as amino acids and alcohol; planetary differentiation in the solar system, which makes the inner planets and the large moons of the outer planets geologically active and provides them with atmospheres; the large differences in the topographies of the larger moons of the solar system. Thanks to these and other discoveries, astronomy, an old, old field, has become one of the most exciting of fields, and practically every year some development or other makes global news.
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Organizational studies, a social science, is also rife with insights. The human organization, one of the mainstays of our civilization, has been subject to the scrutiny of a great variety of social scientists. Economists have studied the competitive behaviour of organizations, especially of business firms. Political scientists have examined the issues of power- and control-related ideologies in organizations. Sociologists have examined the issues of stability, change, deviant behaviour, status stratification, socialization of new employees, organizational roles, and so forth. Psychologists have looked at leadership, group dynamics, social interaction, organizational work climate, and so forth. Anthropologists try to study organizations as communities in order to identify how people create symbols, develop systems for making organizational life meaningful, and create a culture. There are scholars that are studying organizations as if they are biological entities, and thereby trying to understand the birth and death rates of organizations. Some others see organizations as plays or stage shows in which people play different roles. Some are investigating how the organization oppresses the lower level staff, or imprisons their consciousness. Then there are management scholars who are investigating what makes some organizations perform better than others, what sorts of strategies they pursue, what kind of a structure would be compatible with these strategies, how performance could be controlled in the organization, how various activities could be coordinated, how staff members could be motivated, how operations could be made more efficient, and so forth. So luxuriantly active this field presently is that it seems to some a jungle of jargon and a babel of vociferous disagreements. And yet, it oozes with essence creativity.

Look at the insights. Earlier, the organization was thought to be rationally designed, on the basis of 'sound' management principles, an efficient instrument for achieving specific objectives. Now we know that this rational design is often confined to the paper. There is also a live, throbbing, non-formal organization that may deviate strikingly from the formal design. The organization is often a place of strife, where overt and covert battles constantly rage, and this may be intrinsic to the processes by which organizations are managed. It is often a place where a large percentage of the staff feels bored and alienated because the need for efficiency often gives rise to routinization of work, tight supervision, narrowly defined, specialized jobs, and a sense of meaninglessness. Organizations can resemble organized anarchies in which problems get sorted out by accident rather than design. Organizations tend to change in spurts rather than continuously, and indeed, many have long periods of relative freeze on change. They frequently fall sick more due to poor management than because of external factors. Sick organizations can be turned around, and can turn into highly exciting workplaces, almost resembling social movements. There is then a high tide of frenzied brainstorming, intense interactions among the organization's stakeholders, a lot of individual and group creativity, and a flurry of innovations. Equally, it is possible for organizations, including business organizations, to be not only exceptionally successful at achieving their goals, but also to do so through ethical means and also make significant contributions to the social good. Over the years a number of models of

organizational excellence have been fashioned, and these can make a big difference to the quality of people's lives.

What kind of people make sustained contributions of essence creativity? Remember, essence creativity usually requires ferreting out the 'truth' from large, messy piles of information. Besides having reasonably high IQs, the essence creativity people need to have high orders of problem sensitivity (to sense problems or anomalies that others miss); problem restructuring ability, so that difficult problems become tractable; flexibility, so as to examine problems from several different angles; and originality, to come up with novel and useful insights. They also need to be able to use various convergent thinking mechanisms to evaluate options and refine the chosen alternative to make it acceptable to others in the field of knowledge. Where does the energy come from for what often is painstaking, long–term hard work?

Certain personality traits may facilitate the energy required to yield essence creativity. Outstanding scientists are amongst the foremost groups known for their capacity to produce essence creativity. A study of 140 outstanding scientists indicates that compared to the general population they have much higher orders of dominance, that is, they are assertive, independent, and not bound by conventions.<sup>9</sup> They have higher ego strength (maturity, creativity to balance impulses and commitments). They also tend to be more serious, introspective characters rather than being gregarious persons. But they are also emotionally far more sensitive. They are much more radical in thinking, as well as more self–sufficient, and of course, much more intelligent. They are also much more driven by contradictory or disconnected urges. The picture is of a "rather cold, introspective, solemn or even grim, strong–willed, unconventional, and highly intelligent person"<sup>10</sup>, that is often internally troubled.

In another study of outstanding versus mediocre scientists, the personality picture of the outstanding scientist was similar to the above one, but some interesting additional dimensions emerged.<sup>11</sup> Like artists, eminent scientists have a high aesthetic sensitivity, that is, a love of elegant solutions. In addition, outstanding scientists are more interested in, and responsive to, the needs, motives, feelings, and experiences of others. They are also notably less religious and less bothered by social and economic considerations.

Besides being gifted with respect to creative intelligence, outstanding scientists are unusually strong and balanced individuals. They are fiercely independent, unconventional, and assertive but also interested in what others have to say. They are highly complex and emotionally sensitive without being impulsive, and they have high self-control. They are highly methodical but also have a strong aesthetic sensibility. They tend to be loners but also like to interact with other scientists on matters of scientific interest. Their internal turmoils may well impel them to engross themselves in painstaking scientific work. The picture is of high mental energy that is sharply focused on gaining scientific insights and transforming them into publicly useable knowledge. Essence, Elaborative, and Expressive Creativities

Scientists are by no means the only people who make contributions to essence creativity but, certainly, they are among the major contributors. With some mental and personality differences appropriate to other fields, the mental and personality resources of creative scientists may well be needed also by most non-scientist producers of essence creativity such as thinkers and wise persons, mathematicians, theoreticians in the humanities, and inventors.

## **ELABORATIVE CREATIVITY**

If essence creativity is the succinct expression of a novel idea, issue, principle, viewpoint, or law, elaborative creativity is the distinctive elaboration of an idea, viewpoint, principle, law, or issue in ways that render it not only novel but useful or appropriate in its context. Several mechanisms can be pressed into service for creative elaboration. These include seeking causes and reasons relevant to the idea, seeking consequences and applications, utilizing an appropriate classification

system, developing relevant technologies, finding linkages of the idea with other ideas or phenomena, making the creation appropriate to its context, identification of relevant components and their linkages, etc. The more ingeniously–and appropriately–each mechanism is used, the more profoundly creative the elaborated outcome is likely to be.

Elaborative creativity is extremely commonplace. Epics, fiction, essays, poems, and other literary genres (other than proverbs, *mantras*,

haikus, or epigrams) are creative elaborations. Technologies too, are elaborations, as also are complex theories, philosophical systems, and models. Much of art and most crafts are elaborations. Legal, governance, management systems are all elaborations. Many processes, ranging from the way children are reared to the workflow in a factory, are elaborations. Living itself is an elaboration. Psychologists such as Freud would say that it is an elaboration of the struggle for survival, reproduction, and pleasure–seeking principles. So is the cosmos an elaboration–of the Big Bang and the forces it unleashed. So is the evolution of multitudinous life forms and societies. Let us take an example and see how elaborative creativity can come about.

In the 19<sup>th</sup> century, Darwin and Wallace gave the world a new idea: the evolution of so many species on the earth is the consequence of the survival of the fittest mutations. This is one of the finest examples of essence creativity. How may it be creatively elaborated? One way is to explore why, or rather, how mutation takes place. Is it purely accidental, or is it, in some dim sense, purposive, that is, there are mechanisms that predispose a species to certain kinds of survival–friendly mutations? Then, are there different kinds of mutation, and how do they impact evolution? For instance, mutations can be comprehensive or incremental, rapid or slow, related to survival capacity, reproductive ability, or pleasure–seeking capacity. Is mutation strictly a

Truth is a river that is always splitting up into arms that reunite Cyril Connolly

species-specific phenomenon or an inter-species, interactive phenomenon? Could the process of evolution differ in different parts of the globe (e.g. in water, underground, on the ground, in the air); different parts of the solar system (solid versus gaseous planets); and indeed; different parts of the universe? Can we speed up evolution or slow it down or give it a desired direction? For instance, can we as a species evolve towards greater ESP powers like telepathy, clairvoyance, and telekinesis? Towards greater creativity or spirituality? Towards longer and healthier lives? What technologies and bodies of knowledge would be needed for these purposes? How can genetics and genetic engineering be pressed into service? What are the implications of evolution? Is all life evolving towards some superspecies, or will only a superspecies survive and the rest of the species die out or get marginalized? How is cultural evolution related to biological evolution? Where do ethics come in vis-à-vis issues related to evolution such as the survival of the fittest? One can go on and on. The point is that creative elaboration can happen when an idea or a phenomenon is examined from different perspectives. Provocative questions and uncommon perspectives are likely to yield greater elaborative creativity than humdrum questions and familiar perspectives. And since elaboration frequently involves the linking together of components, the more distinctive the components and the more novel the links forged between them, the greater may be elaborative creativity. In any particular work, however, creative elaboration need not be endless. Brevity and creative elaboration can go together. (See box on *Elaborative Creativity in Short Poems* $^{12}$ .)

Let me explore the potential for creative elaboration of an important idea in the field of creativity. Broadly speaking, people can be motivated into performing a task by 'extrinsic' rewards like money, position, power, and praise or 'intrinsic' rewards like the excitement and pleasure of doing the task. Teresa Amabile has advanced the view that creative work is primarily motivated by 'intrinsic' rewards, and indeed, extrinsic rewards may dull the creative urge.<sup>13</sup> Here again, a series of queries can lead to creative elaboration. Are there different sorts of intrinsic motivation---say, one relating to how interesting a task is, another relating to how challenging it is, a third relating to how novel it is, a fourth relating to how personally meaningful it is in terms of one's values or core beliefs, and so forth? We know that there are different sorts of creativities--essence, elaborative, expressive, existential, entrepreneurial, empowering, etc. Which intrinsic reward would most powerfully motivate what sort of creativity? Can we raise people's appetite for intrinsic satisfaction in an economic system driven by extrinsic rewards? Even if extrinsic rewards dampen the creative urge, the absence of extrinsic rewards may dampen it even more. A person may work tirelessly in search of a formula for slowing the process of aging. He or she may expect no monetary or other extrinsic rewards. But what happens if the person discovers the formula but some one else is unfairly rewarded for it with a prestigious prize? If so, what is an appropriately designed system of intrinsic and extrinsic rewards for motivating creative work? Today, much creative work in science, technology and business is done by teams. What reward system would be best for a team in which the need for intrinsic and extrinsic rewards

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## **Elaborative Creativity in Short Poems**

Although essence creativity is much more frugal than elaborative creativity, in the hands of a master brevity and creative elaboration can go together. Here is an example from the 11<sup>th</sup> century poem of a member of the Veer Shaiva sect of South India.

Where the mango tree, where the koilbird! When were they kin? Mountain gooseberry and sea salt: When were they kin? And when was I kin to the Lord of Caves

(Allama Prabhu)

Notice how a central idea (the magical relation of God and man) is elaborated through powerful questions, metaphors, and imagery.

varies considerably as between the team members? How do we apply any knowledge we have on creativity motivation for spurring classroom creativity? How can parents, teachers, and supervisors be trained to administer creativity–enhancing reward systems? In Third World countries, there are huge gaps between their standards and global–level productivity, quality of products, and customer orientation. These gaps can be bridged relatively quickly through innovations. How do we motivate semi–literate, poorly trained workforces to design/adopt/effectively implement the needed innovations?

Alex Osborn developed a powerful technique called checklist of questions for modifying any product, event, or activity.<sup>14</sup> Some of his most powerful questions are: What can we add, delete, modify? What alternative means can be used? What rearrangement of components is possible? How can we magnify impact? How can we miniaturize for greater control and efficiency? What

other uses can be thought of? What can be radical alternatives? The technique can also facilitate practical elaborative creativity. Take any idea, such as Maslow's idea of the hierarchy of human needs. What needs can we add to his list or delete or modify? What are alternative ways of satisfying each need? Can we create non-hierarchical relations among the needs? For example, how can we trigger the need for self-actualization well before satisfying the 'lower order' needs of security, affiliation, or self-esteem? How can we intensify the need for self-actualization? How can we channel every active need towards creative and innovation-oriented effort? What could be different ways needs could be triggered? Are there subliminal alternatives to more overt, explicit, 'loud' ways? Can we think of models of human needs and their relationships that are radically different from Maslow's conception, for example, the idea that mental programming by instilling duties and responsibilities can wholly replace need arousal for creative behaviour?

There is an interesting difference between essence and elaborative creativity. Essence creativity is usually the labour of an individual. Elaborative creativity frequently is a collective effort in which many may participate, bringing to the creation manifold perspectives and competencies. The Mahabharata, the world's longest and greatest epic, is a striking example of collective elaborative creativity. This epic of 100000 stanzas has evolved from a brief legend titled Jaya (Victory) written up in about 200 BC. That legend spoke of a war between cousins (the sons of Pandu and the sons of Dhritarashtra) for the throne of Hastinapur in northern India. The Pandavas won that war. Such struggles are hardly uncommon; even Asoka the Great resorted to fratricide to gain the Mauryan throne. Over the centuries, however, Java became an epic, as characters became larger than life, new characters were added, stories from different parts of India joined the mainstream story, ethical and other issues were explored, worldly as well as divine wisdom entered the fray, and human strengths, failings, tragedy, and glory were scaled up to epical heights. Today there are some 60 different versions, mostly regional variations. Effort has been on for several decades at the Bhandarkar Institute of Oriental Studies in Pune (western India), to identify the core Mahabharata and its regional variations. What is true of the Mahabharata is true of organizations. Most organizations begin as someone's brainchild. Then, 10, 15, or 20 years later the organization may grow up large and diversified, much like a banyan tree. How could this happen? Through the contributions of many managers, employees, and other stakeholders. Elaboration cannot be monopolized.

## **EXPRESSIVE CREATIVITY**

Fresh, effective communication has the power to move, restore, delight, stun, or amaze. No wonder it is prized so much in literature and the arts, oratory, propaganda, slogans, advertising and promotion, product design, and public and private communications. Even scientists relish elegantly proven theorems or elegantly derived formulations. There is no magical way to Essence, Elaborative, and Expressive Creativities

expressive creativity, for what delights in one situation may bore in another. Expressive creativity often works with compensatory opposites. When the rhetorical and ornamental is culminated in simple, direct language, it can be very effective. But so can the simple message delivered with powerful rhetorical devices. Nehru's stirring, evocative opening lines in India's parliament at the dawn of Indian independence in 1947 are a case in point: "Long years ago, India made a tryst with destiny and the hour has come to redeem her pledge. At the stroke of the midnight hour, when the world sleeps, India will awake to life and freedom."

Several seemingly opposed mechanisms are available for expressive creativity in the arts, literature, and communication fields like advertising and speech. Here are some. Their judicious use can add a lot of sparkle to drab expression. Art is a lie that makes us realize the truth Pablo Picasso

### Suggestion and Statement

As Krishna Rayan has put it, suggestion "is a dominant characteristic of modernist literary practice",<sup>15</sup> as also of Indian classical poetics. Suggestion works by evocation of images, resonances, and associations; statement, by attention–getting information. Or, to put it differently, suggestion connotes while statement denotes. Many people try to make an impact but only very few succeed. This is a statement. But here is a little poem of mine that puts this suggestively.<sup>16</sup>

Many feet tread water Only a few leave prints

It is not as if suggestion has it all the time. A statement can also be quite potent, as Vivekanand's call for spiritual awakening: "Arise, awake, and stop not till the goal is reached." Or, Jesus' proclamation: "Blessed are the meek for they shall inherit the Kingdom of Heaven."

### Virtuality and Realism

Words, voice, gestures, colour, and limbs have a phenomenal capacity to create a virtual reality or illusion. As Suzanne Langer, the philosopher of art put it,, "…illusion is an important principle in art."<sup>17</sup> A horse that is painted on a canvas is a horse, but not any horse. It is a unique, dynamic, particular form of a horse that can evoke a feeling within us, and when painted well, a feeling of aesthetic enjoyment. As she argued, an artist creates a sheer vision of what may be a familiar object. This vision is both real as well as illusionary (it depicts it in a form that exists only in the artist's mind).<sup>18</sup> What is true of virtual creation of space (as in a painting) is also true of virtual creation of felt time (through beat and rhythm in music, for example). Science however, is

different. It aims at uncovering from concrete forms a higher, abstract, invariant reality. Newton's laws of motion are forever and everywhere, although subject to local situations or the operation of higher laws. A painter, too, may tackle motion, such as a ship steaming out of a harbour, but the relationship between the abstraction (moving ship) and reality (perception of the motion of the ship) is not invariant. On the contrary, a moving ship can be painted in innumerable ways, and each painting can evoke many and varying reactions in the viewers of the painting. Thus, "all art is the creation of 'expressive forms' or apparent forms expressive of human feeling."<sup>19</sup>

Virtual reality is a widely used device in all forms of expressive creativity. Films use it (e.g. virtual sex, virtual mayhem, virtual romance). Ads also utilize it by creating temporary illusions of deficit, terror, omnipotence, or bliss. But if make-believe and magic realism are widely used, so is realism. 'Socialist' realism in films and other media is one form; so is stark documentation of human tragedies. When make-believe is overdone, realism comes as a breath of fresh air. Whether virtuality or realism help or hinder expressive creativity is a matter of situational appropriateness and a balance in their usage.

### Hype and Understatement

Hype catches attention through exaggeration—'best', 'greatest', 'strongest', 'unique', 'amazing', 'path-breaking', 'rivetting' and so forth, the stock-in-trade of commercial promotion. Understatement diverts attention to what is implied rather than stated. It is widely used in diplomacy and humour, not to mention literature and the arts. "Give me liberty or give me death" was Patrick Henry's hype about liberty, and "Eternal vigilance is the price of liberty" was John Curran's. Thomas Fuller's "Lean liberty is better than fat slavery" is as effective through being an understatement. And here is Mark Twain's hype and its put down: "It is by the goodness of God that in our country we have those three unspeakably precious things: freedom of speech, freedom of conscience, and the prudence never to practice either of them"!

### **Metaphor and Imagery**

Metaphor is a selectively imaginative equation; imagery is a graphic representation. According to Carl Hausman, metaphor–such as Richard the Lion–hearted–equates two dissimilar identities in such a way that meanings and implications attaching to one of the identities are seen also in the other.<sup>20</sup> Thus King Richard of England did not have the heart of a lion; but he was courageous like a lion. On the other hand, Richard did not possess many of the other traits of a lion–its mane, tawny colour, its feeding off the kills of lionesses, etc. The creation of a metaphor is often an interactive process. There is cognitive tension between the similarity and the differences between the two identities involved in a metaphor, and this tension is resolved when the similarities are

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appropriately integrated into a new view of the identity metaphorized. Richard the Lion–hearted turns into a different monarch than brave King Richard.

Metaphors often get transformed into symbols. A symbol distances the connection between two identities, and makes the connection more open–ended, that is, capable of multiple interpretations. A symbol stands for or represents something else. A flag, for instance, represents a nation and therefore symbolises it. In fact, each word is a symbol, for it represents (only approximately) a reality. In expressive creativity, however, a metaphor or symbol has not only a denotative but also a connotative or evocative function. A courageous lady may be described as a tower of strength. Tower of strength is, here, a metaphor. But if this property of feminine courage is highlighted in a work, it could become a symbol of brave womanhood, as in Brecht's *Mother Courage*.

Imagery may or may not have a symbolic function. But it is always used for eliciting a sensuous response. Here is T. S Eliot's magnificent imagery of fog in *The Love Song of J. Alfred Prufrock*.<sup>21</sup>

The yellow fog that rubs its back upon the window-panes, The yellow smoke that rubs its muzzle on the window-panes Licked its tongue into the corners of the evening, Lingered upon the pools that stand in drains. Let fall upon its back the soot that falls from chimneys, Slipped by the terrace, made a sudden leap, And seeing that it was a soft October night, Curled once about the house, and fell asleep.

The sensuous behaviour of the cat-like fog is enjoyable in its own right because of its dynamic graphic quality. The imagery, however, may have symbolic or metaphoric content, depending upon what meaning the reader wants to invest in the yellowness of the fog, corners of the evening, filthy pools in the gutters, falling chimney soot, etc.

Creative communication uses, of course, many tropes (figures of speech) besides metaphor and imagery, such as metonyms, irony, hyperbole, oxymorons, idioms and so forth. Whether a communication is creative or not would depend upon how ingeniously a trope is used and also how appropriately it is used (see box on *The Magic of Expressive Creativity*).

The movements in the 20<sup>th</sup> century art illustrate the workings of several mechanisms of expressive creativity. "The first decades of the 20<sup>th</sup> century were marked by a wave of creative experimentation without precedence in Western art", wrote Nicholas Fry, a historian of art.<sup>24</sup> Rejecting past traditions, the 'wild beasts' of painting, headed by Henri Matisse, aggressively used unnatural colours. Cézanne sought to render three–dimensional subjects into a series of two–dimensional planes. Picasso and Braque, labelled Cubists, broke up their subjects into their structural components and then reassembled them into two–dimensional forms; later, both two and three dimensional collages were created on the canvas with the use of both paint and other

materials in an effort to blur the line between fact and fiction. The Futurist movement, originating in Italy, sought to use abstracted lines of force, and repetition of objects, to convey speed and movement. Expressionism took root in Germany, and sought to convey intense, anguished pessimism. Piet Mondrian in Holland sought instead to depict simplicity and calm through the use of horizontal and vertical bands of primary colours interspersed with white or grey in rectangular frames. The effort was to reject all human associations and instead seek only to evoke an entirely abstract sensual response in the viewer. Paul Klee of Germany sought to replace the consciousness of modern life by the intuitive child–likeness of the primitive. The Dadaists, based in Zurich, Switzerland, rejected all effort at 'art'. Dadaism turned into Surrealism in Paris. The

## The Magic of Expressive Creativity

Patricia Lynch's study of gifted Irish children provides fine examples of expressive creativity.<sup>22</sup> There were 30 of them, winners of national awards in music, the arts, writing, and science. They were compared with 30 other school children from similar schools who had not won any of these awards. Both were compared on a divergent production test called Espressioni. Of course, the creative 30 greatly outscored the other 30 on several tests of divergent production. The differences in their expressive creativity were fascinating.

For instance, there was an exercise in which three-word phrases were to be created, with each word beginning with the letter S. Response of the less creative 30 included "sing some songs", "six sweet sweets", and "sit still Sheila". The high creatives responded with "shy snakes sliding", "swift stony streams", "slow slimy snails", and so on.

In another test, the subjects were asked to indicate atmospheric phenomena, such as sunset or storm or fog, through drawings. The drawings of the less creatives included the sun sinking below hills, sun behind trees, sun behind house, etc. The high creatives' drawings included a person in a night attire bearing a candle, the face of the sun seen through darkened spectacles, a weeping face with disheveled hair, etc.

In another test, the subjects were asked to give a title to a story about a plane that made an emergency landing among primitives. The crew went off for help, and the primitives, believing that the plane was a great bird, performed a ritual dance around it, hoping for an egg which, of course, did not materialize. The titles given by the less creatives included

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Friendly Natives, The Sorcerer's Egg, The Dance of the Natives. The titles given by the high creatives included Eggspecting, Wrong Bird, The Sleeping Beauty, and The Cock Aeroplane.

Notice the playfulness of the gifted 30. They were less controlled by the situation provided to them. They were more imaginative and venturesome without giving wrong or inappropriate responses. The research found that the creative 30 set higher standards for themselves, drew more widely from their vocabulary, synthesized ideas imaginatively and appropriately, and evaluated their ideas better.

Even scientists can wax lyrical. When Harrison Gough administered 45 professional research scientists in California, US, some free-response tests to phrases like sound of a foghorn or empty book-cases, he harvested from the more creative scientists some super images.<sup>23</sup> For sound of a foghorn, images provided included 'a single tree on the prairie,' 'wind through an empty house', 'wail of a child left alone.' For empty book-cases, images included 'blank pages' and 'a nation without a soul'.

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Surrealists, led by the Spaniard Miro, believed that human existence is more truly depicted in our dreams and free associations than through the traditional themes of art. Victor Vasarely, a Hungarian–French, founded Op Art, in which the attempt was to juxtapose dissonant colour tones and geometric shapes to convey movement. Jackson Pollock of the US dribbled paint into a canvas stretched out on the floor in an effort at more immediate communication between the painter and the viewer. The US has also spawned Pop Art, which is an attempt at return to realism, but to the realism of a crude, consumerist, mass media society. The foregoing 'revolutions' in the 20<sup>th</sup> century have not been confined only to painting. There have been comparable revolutions in sculpture, architecture, music, and literature.

These 'revolutions' in art illustrate several mechanisms of expressive creativity. The first is a *distinctive* point of view of the artist, ranging from the wholesale rejection of artiness, that is, all previous artistic themes and structures by the Dadaists, to the depiction of our dreams and nightmares as the only human truth by the Surrealists. This viewpoint is the artist's message, the ideological dimension of expressive creativity. The second is the medium following the message, the attempt to mould the artistic medium to the artist's message or ideology. A novel perspective is blended with innovations in the medium (new ways of applying brush strokes, the use of

unnatural colours, the use of dis-assembled figures, the use of abstractions, the use of lines and rectangles, etc.) to generate a new mode of painting. There is also a lot of experimentation and trial-and-error learning for mastering the new mode. Communities of artists develop around each new mode of painting, and their members stimulate one another to new forms and variations.

Illness may also play a prominent role in expressive creativity. In Jamison's study of British and Irish poets born between AD 1705 and 1805, the poets were 30 times more likely to have committed suicide, and 20 times more likely to have been committed to an asylum, than the general population.<sup>25</sup> In her study of 47 eminent British writers, nearly 40% had been treated for mood disorders, as compared to 1% of the general population. Such mood distortions can facilitate unusual ways of viewing the world, one of the characteristics of expressive creativity. Such hyper-sensitive people show a higher incidence of manic-depressive illness than the general population. They are prone to mood swings from depression to normality to 'hypomania' (a mildly energized state) to mania or extreme and unproductive restlessness. Hypomania is believed to be most useful for creative work because there is, during this mood, increased energy, expansiveness, risk taking, fluent and flexible thinking, ability to form original associations and combinations of ideas, etc. Even depression can be useful, for it may add depth to the artistic transformations and assist in the self-critical editing and evaluation needed to refine the creative product. For such sensitive people, ways of inducing a positive mood or hypomania can be useful for creative work, and many do, in fact, turn to nature, mild drugs, alcohol, uplifting music or literature, and stimulating company to 'get into the mood' for creation. Some unfortunately, do lose their way in alcoholism and drugs.

Even a prolonged physical illness can be productive. A study of 21 famous Western painters and other artists indicated that a period of illness operated as a time of creative chaos.<sup>26</sup> In this period, physical illness heightened the receptivity to new forms of expression of the likes of Botticelli, Toulouse–Lautrec, Munch, Matisse, and Durer. A transition took place to a new stage of life, and led to major changes in the artwork.

Expressive creativity is not just a matter of mechanisms. It is also a matter of aesthetic disposition. Francis Hare, drawing on a number of earlier studies, has suggested that aesthetic behaviour is triggered by perceived complexity.<sup>27</sup> Probing complexity–curiosity–may be pleasurable in its own right, rather than because it provides respite from such primary needs as hunger, thirst, physical security, or sexual arousal. The artistic person may have much higher level of responsiveness to complex materials than the ordinary person. Curiosity leads to exploratory behaviour, which, too, may be pleasurable in its own right because it involves further exposure to stimulating information and experiences. Exploratory behaviour may arouse high energy in the individual. Aesthetic needs—for pleasingness, beauty, etc.—may channel exploratory behaviour towards expressive creativity, as would the skills, previous training, and

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the distinctive individuality of the creator. Much trial-and-error manipulation of the resulting 'stimulus configurations' or artistic raw materials may go on before something emerges that satisfies the aesthetic and 'interestingness' criteria of the creator. At this point, an artistic creation emerges that may have expressive creativity.

## CONCLUDING COMMENTS

Essence, elaborative, and expressive creativities are available to all of us, once we understand how they work. They can add aroma to the breath of our life. In the next chapter we look at the profiles of entrepreneurial, existential, and empowerment creativities.

Quiz

I. Do you see any links between the physiological, mental, spiritual, and social roots of creativity (reviewed in the previous two chapters) and essence, elaborative, and expressive creativites?

2.	"Creativity is a productive insanity." Is this true of essence, elaborative, and expressive creativities?			
3.	What role may insights play in elaborative and expressive creativities?			

4. Are there any differences in the personalities of those who excel at essence creativity from those who excel at expressive or elaborative creativies?

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- 5. Would it be possible to make essence creativity and expressive creativity collective efforts?

## MENTAL GYM

1. Try and find at least three examples that fit each of the following statements of creativity "experts".

(i) "The only sure weapon against bad ideas is better ideas."
(ii) "A single idea, if it is right, saves us the labour of an infinity of experiences."
(iii) "Where there is an open mind, there will always be a frontier."
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(iv) "For creating a master work, two powers must concur—the power of the person and the power of the moment."

(v) "Invention is 1% inspiration and 99% perspiration."

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- 2. Take an example that fits each of the above statements and elaborate it.

3. Give at least three creative titles to each of your elaborations.

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- 4. Take a holy book of your choice Gita, Bible, Quran, or any other and try to identify their essence, elaborative, and expressive creativities.

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Essence, Elaborative, and Expressive Creativities

## 7

# Existential, Entrepreneurial, and Empowerment Creativities



## **EXISTENTIAL CREATIVITY**

There is a school of thinkers-mainly humanistic psychologists-that believes that humans stone themselves into a dulled consciousness. To make such zombies alive and creative again is the chief concern of these thinkers. Their aim is to recover the freshness, the wit, the curiosity, the creativity, and the childlike openness buried deep in the bullock consciousness of the adult. As Abraham Maslow, one of the leaders of the self-actualization band put it, "I can see no evil in a baby... it is a person...In fact, it is apt to be a very **good** person ....one bearing many of the hard-won characteristics of self-actualising persons, whose great achievement is to become childlike again ..."<sup>1</sup>. (See box on *Maslow's Vision of Self-actualisation*.)

Why do we degenerate from the vitality of childhood to the set ways of the adult bullock? A negative imagination may be a major culprit. As Bertrand Russell once reportedly opined, we have imagined ourselves into littleness, darkness, and ignorance and we Man's main task is to give birth to himself Erich Fromm

### Maslow's Vision of Self-actualization

Abraham Maslow clarified what self-actualization is about. It refers, he wrote, to man's desire for self-fulfilment, to become everything that one is capable of. He affirmed that the self-actualized person is a healthy person, and indeed, if one is not self-actualizing, then that is a symptom of mental rundown. He also related creativity to self-actualization-the self-actualized person tends to do everything creatively, even cooking, cleaning, and raising a family.

Lynn Buckmaster and Gary Davis have identified several traits of the self-actualized person, and have tried to measure them through an instrument called ROSE.<sup>2</sup> These traits include acceptance of one's self and also others, warts and all; spontaneity and naturalness; being problem-centred rather than self-centred; high concentration on subjects and need for privacy; a sense of independence and autonomy; feeling of wonder; frequent peak, memorable experiences; feelings of brotherhood; lasting relationships; a sense of ethics; humour; and creativity.

have to imagine ourselves back into the light.<sup>3</sup> Imagination is a creative force. Do we visualise ourselves as smug, successful, well-respected persons or do we imagine ourselves to be creators of the self, constantly probing and experimenting and experiencing, and thereby constantly growing and actualizing our potential? Limited aspirations and values shrink us to selfishness; higher aspirations and values exalt us beyond it. As Elizabeth Drews puts it, "When the goals that people seek conform to the lower values, there is usually conflict because the objects valued-money, status, power-are necessarily in short supply...In contrast, the higher values-the good, the true, and the beautiful-can be shared without limit."<sup>4</sup> As she affirms forcefully, "Without a vision, the people perish."5

These thinkers consider 'technical' creativity as less significant than 'person' creativity. "Will innovations such as high-rise or water-borne habitations combat or confirm meaninglessness and apathy, violence in the streets, and hostility in our hearts?...most innovations of a technical nature do not help us to combat evil, to conceive a better world, or to foster...even the 'slightest improvement in human behaviour'."6

So, what kind of creativity do the humanistic psychologists prefer? They prefer a creativity "...that will help those who create to realize themselves and simultaneously ...enhance the

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human and natural worlds."<sup>7</sup> They prefer a health food creativity that enlarges the creator without eroding the well-being of others.

How does existential creativity arise? It arises "...when the individual is 'open' to all of his experience...".<sup>8</sup> The creative insight comes at that moment when "the unlike and the unlikely join and become compatible and comely."<sup>9</sup>

Drawing on the ideas of both psychological fusion and of emotional dynamics, Frank Friedlander has proposed an interesting model of learning and creative transformation that can be applied to any human system, be it an individual or a group or a community or an organization or a culture.<sup>10</sup> If a human system experiences a conflict, either within itself or with another human system, the outcome could be frustration, pain, fear, etc. This is a choice situation. If the human system gets defensive and resorts to resistance, denial of reality, or unreasonable rage and aggression, it will not learn anything and will stagnate. But it could make contact with the 'opposition', interact with it, and have a dialogue with it, try to understand its perspective. In this case, it would change, learn, possibly become more creative because of its absorption of new ideas and perspectives. But tension may be created within the system by these alien ideas and perspectives. This is another choice point—to resist or reject as alien these new thoughts; or accept them and risk an identity crisis, and re-organize or re-invent itself. If a human system learns to be 'open' in this way, assimilation and innovation can be rapid, and the system can go from strength to strength. The main culprits preventing this sort of transformation are fearfulness and defensiveness, and the crutches of stability and continuity.

There are some practical ways to enhance existential creativity. Scholars have found that self-actualized persons tend to have a personality structure that overlaps considerably with the personality structure of the creative person, and indeed, those that do creative things tend to be self-actualizers, although there may be many exceptions here.<sup>11</sup> Thus, a diagnosis of how close one is to the model of creative personality (outlined in Chapter 12) can help one locate traits that need to be strengthened. Given a strong enough desire to enhance existential creativity, the person can think up a plan for strengthening weak traits. There are a number of training programmes available that can enable a person to strengthen traits related to existential creativity. These include creativity training programmes, sensitivity training programmes, EST, Landmark Forum's programmes, personal growth labs, etc.

A second way of enhancing existential creativity is to increase the consequences of existential creativity, namely peak experiences. A peak experience is "one of intense happiness and joy, of ecstasy, rapture, and bliss. Peak experiences result from profound aesthetic experiences, love and passion, religious ecstasy, great achievements, creative accomplishments, and so forth. During a peak experience a person feels more whole, more alive, more at one with the world, more self-sufficient, more spontaneous and less inhibited, less aware of the passage of time, and more aware of beauty, truth, goodness, justice, simplicity, and order. Peak experiences are

self-actualizing experiences."<sup>12</sup> Thus, an attempt to increase the frequency of peak experiences may get us closer to existential creativity.

What actions get us peak experiences? These are likely to differ from person to person, but Stuart Chase has interestingly differentiated the kinds of experiences that have provided him a sense of intense living, from those that provide a sense of mere, drab existence.<sup>13</sup> The ratio of 'living' actions to 'existence' actions may be a scorecard of existential creativity. Chase includes among his 'living' actions doing something creative, such as writing an article or making a sketch or working on a theory or building a bookshelf; seeing beautiful art or architecture; reading fine literature; attending quality musical or dance concerts or operas; scaling mountains, scanning the stars and, the sea; experiencing a surge of love and friendship; having a good conversation and an exhilarating argument; doing something adventurous and dangerous, such as rock climbing; being in the presence of genuine sorrow; engaging in robust, outdoor play; eating after genuine hunger, or drinking water from a cool stream after climbing a hill; getting into a sound, deep sleep after a day of hard labour; and enjoying a round of spontaneous, hearty laughter.

And 'existing'? Drudgeries, like washing dishes, shaving, dressing, buying groceries. Attending social functions, such as a tea, dinner, or a lecture. Eating, drinking, or sleeping when the stomach is full and the senses are dulled. Seeing monotonous, familiar things like streets, rooms, furniture. Sheer ugliness, such as a ghetto. Anger, fights, misunderstandings, getting even.

We all can 'live' more and grow in the process, and enrich our existence as also those of others close to us. Existential experiences can be sought. In a course on creativity that I taught, I asked the students to do something creative and reflect upon the process. Most turned in a poem, an invention, a design, or some other creative product. But three of them wrote about their creative experiences. One slept naked on the grass for a whole night in the wooded grounds of an institution. Another bandaged his eyes and turned blind for two full days that he spent in an institution for the blind, trusting his life entirely to the blind. A third took off for the mountains and trekked in the wilderness at night. My daughter, in one of her self-actualization moods, decided in her teens to spend half a day on a dirty, congested street, to experience what it feels like to be poor. An acquaintance of mine, whenever depressed, would go off to the cancer ward of a hospital to provide succour to patients. There she felt how lucky she was.

Finally, freeing the mind up to ideate may get us closer to existential creativity, although the reverse can also happen. Research in New Zealand indicates a connection between divergent thinking ability and several traits we associate with existential creativity. High scorers on tests of fluency and flexibility preferred to run risks, do new things, undertake dangerous experiments, investigate the unusual, make jokes, and seek expertise more than the low scorers.<sup>14</sup>

Self-actualization is an exhilarating lifelong trip. But there is a danger of it turning into self-centredness and even selfishness. It needs to be tempered by a developed sense of right and

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wrong, a concern for one's self balanced by values and a concern for others (see box on *Moral Creativity*).

There is another danger associated with self-actualization, namely, one's turning into a dilettante. A dilettante strolls into many streets but without serious intent—a bit of art, a bit of craft, a floater into this and that. Self-actualization is about actualizing one's potential, and that means intense striving, learning from the effort, and growing, with the learning permeating not just one

## **Moral Creativity**

A number of creativity scholars have tried to explore what they call moral creativity. Milton Schwebel has identified several consensually held moral imperatives, namely, the sacredness of human life, justice, equality, freedom, and struggle against oppression, poverty, and dehumanization.<sup>15</sup> Howard Gruber has given a neat definition—and exhortation—for moral creativity. Creativity in the moral domain = ought implies can implies create. That is to say, if what ought to be can be done, then it should be created.<sup>16</sup>

Moral creativity can manifest itself in many ways. In an Italian study of 370 adolescents, it was found that when they were asked to respond to such moral dilemmas as abortion, euthanasia, and civil rights during wartime, the creatively gifted adolescents tended to offer more original solutions than the non-gifted.<sup>17</sup> However, the solutions of the gifted tended to be more pragmatic and less altruistic than those of the non-gifted. In the arts, moral creativity can take the form of expressing moral concerns through works of art,<sup>18</sup> such as Picasso's famous painting *Guernica*, which depicts the horror of the Spanish civil war. It can take the form of empathy, and this can provide the foundation for humane and altruistic social behaviour.<sup>19</sup>

Michael Piechowski has made an important point.<sup>20</sup> Moral creativity is an internal developmental process. It involves an inner transformation through five levels. The two lower levels are self-centredness and inner confusion, and directionlessness or passive conformity to life. In the third level, a conflict erupts between our higher and lower selves, and there is discontent and a nagging sense of deficiency. In the fourth level, inner convictions emerge, and there is an integration of ideals and actions. In the final level emerges a lifelong commitment to a powerful ideal or mission that represents a peak of moral creativity.

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A stage of self-purification is frequently required before moral creativity can manifest itself—a stage in which good and evil wrestle one another inside us for mastery. Mahatma Gandhi spent over 10 years in South Africa, purging himself of sexuality, greed, and aggression before his great moral mission of liberating India from British rule emerged.<sup>21</sup> Gautama Buddha, too, spent many years wandering, undergoing penances, and meditating before the Middle Way came to him as an enlightenment.

Piechowski has described how Etty Hillesum morally transformed herself during World War II.<sup>22</sup> This young Jewess lived in Amsterdam, a life full of friends, lovers, and intellectual stimulation. But an inner emptiness gnawed at her. Her diary reveals her struggle against inner chaos, restlessness, depression, despair, and pain. But she triumphed through prayer and found inner peace beyond space and time. Meditation helped her create within herself a vast space– in that part of herself that to her was the deepest and richest – in which God could descend. She lived in Nazi times, and the compassion welling within her made her volunteer for a transit camp from which the next stop was the gas chambers at Auschwitz. She was last seen embarking for the concentration camp with a song on her lips. She left behind a timeless message, "I no longer believe that we can change anything in the world until we have first changed ourselves…Each of us must turn inward and destroy in himself all that he thinks he ought to destroy in others."<sup>23</sup>

Self-actualization plus self-purification may just be the right formula for existential creativity for our species.

The master of the house— is he at home or not?	The grass has grown to the threshold and the house is filled with dirt. Is the master home or not?	If the body is full of lies and the mind full of passions, the master cannot be home.	
• (Basavanna, 11 <sup>th</sup> century South Indian poet)			
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facet of our personality or activity but most of them. That is how self-actualization turns into self-transformation. Many seek excellence, say in their professions. But there is frequently little transfer of the values and skills to other areas of life, such as one's lifestyle or one's close relationships. There are scientists, for example, who are highly methodical at work, but utterly sloppy at home; first-rate public relations or communications professionals who remain cantankerous at home; social reformers who cannot shed their vices; and poets whose verbal glow does not light up their own life. Compartmentalized living handcuffs existential creativity. Existential creativity blooms when self-actualization amounts to not just doing whatever one fancies – doing one's thing–but turns into a serious commitment to transforming the self itself (see box on *Frank Barron: Consistency in Self-actualization*).

## Frank Barron: Consistency in Self-actualization

Frank Barron is one of the father figures in the field of creativity research. Along with Donald MacKinnon and others, he founded the Institute of Personality Assessment and Research (IPAR) at the University of California at Berkeley. Its pioneering studies of a variety of creative professionals, including mathematicians, writers, artists, scientists, and architects, have greatly enlarged our understanding of the creative personality.

Barron has been one of those few who learn a lot from their experiences and infuse much of their life and work with the insights they have gained. Born a Catholic in a coal town in Pennsylvania, US, to a psychic mother and a handyman father, he learnt early the virtues of practical, hard work as well as the excitement of probing the underknown.<sup>24</sup> He went to a convent school and then to a Christian college, and his birth and this education firmed the theological bent of his mind. An internship in a mental institution led him to psychology. At the University of Minnesota, he developed a penchant for experimental psychology.

World War II intervened and he joined the military in the Air Corps. He was transferred to a medical unit and did duty in France. It exposed him to the horrors of war. It buttressed

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his pacifist inclinations. He stayed on in Europe after the war was over to write the history of his unit and edit its newspaper. He stepped out of line and called for the publication of all the information on the making of atomic weapons. He wanted to hasten a world government and the banning of nuclear weapons. He barely escaped being hauled up for treason!

In a state of shock and despair, Barron went to Cambridge, England, to study moral science. Searching for the roots of human behaviour, he studied genetics at Biarritz. He resolved to become a psychologist and help build a better world. He even gave a talk at Los Alamos, where the first atom bomb was built. He offered a course on nuclear disarmament at Harvard. He co-developed an instrument for measuring one's personal philosophy and it included a scale for measuring attitudes towards disarmament. Later on, at a university, he even refused to sign a loyalty oath and chose instead to resign from the position.

How did Barron's moral concerns influence his work on creativity? After a doctorate in psychology at Berkeley, Barron co-founded IPAR to think about and investigate 'higher things.' Barron's interest in effective personality led to the investigation of the creative personality. His approach to the study of creativity has emphasized all the lessons he had learnt earlier—a practical orientation to life (creativity that works) and deep moral and spiritual concerns (humane creativity). His model of the human creator resembles the Creator in autonomy and the will to transform through a spiritual quest. He has called the creative person a transformed transformer whose creativity flows out of the capacity and the intent to bring something new into existence, like the divine Creator of the Bible. He believes that high-level creators are generally pacifists, and creativity restrains the individual's aggression through the development of a refined ethical sensitivity.<sup>25</sup> As the Americans say, Barron walks the talk.

## **ENTREPRENEURIAL CREATIVITY**

The human is, from times immemorial, a venturer. As a hunter-gatherer, looter, predator, conqueror, voyager, trader, manufacturer, or institution-builder, the human is a past master at The most gifted are at their creative best where they cannot have their way Eric Hoffer

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gathering human, financial, technical, and informational resources, welding them into an organization, and setting out to achieve the purposes of his or her venture, be they commercial or otherwise. This process of creating and operating a venture for material or other goals constitutes entrepreneurship. Teresa Amabile has defined entrepreneurial creativity as the generation and implementation of novel, appropriate ideas to establish a new venture.<sup>26</sup> Entrepreneurial creativity covers novel offerings of products/services, novel means for producing them, novel 'markets' tapped, novel resources utilized or novel ways of utilizing resources, use of novel technologies or novel ways of using a technology, novel ways of managing the venture, etc.<sup>27</sup> (See box on *Sparkle of Entrepreneurship Creativity*). The more novel a successful venture, the greater is entrepreneurial creativity.

### Sparkle of Entrepreneurial Creativity

 Can a mechanical engineer, paralysed from neck downwards due to an accident, turn into an innovative entrepreneur? Yes, indeed. Rajan Paul, the person who was so paralysed, teamed up with C.P. Philipose, another mechanical engineer, to start and run successfully a factory-less, workers-less industry that catalysed employment for over 6000 persons in Kerala, south India.<sup>28</sup> With some savings and funding from friends, they set up in the mid-1980s Sevana Electrical Appliances to produce and market plastic bag sealing machines. Initially, two unemployed youngsters were trained in how to manufacture these machines. After the training, they began to assemble the machines at home from components supplied by Sevana. Sevana marketed the machines. Perceiving gainful employment, villagers flocked to do likewise, and within two years, over 100 families got involved. By the mid-1990s over 200 home units were producing 35 different types of sealing machines, and making a decent living out of doing so. Sevana became profitable in 1989–90, and by 1994–95 the profits grew 16 times. It even exported machines. The Sevana model caught on, and a number of similar enterprises came up, providing employment to one-fifth of the local area population, and marketing home assembled medical equipment, rubber sheet drying machines, and steel knives.

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The McGraw Hill Companies

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- Can a small time entrepreneur practically find a new industry? Yes, indeed. Joseph-Armand Bombardier of Quebec, Canada, did just that.<sup>29</sup> Much of the Canadian countryside is snow-bound during the long winter. Bombardier developed, based on an earlier invention, a tracked vehicle called Ski-Doo (a snowmobile) that could ride safely over the snow and ice at respectable speeds. It was bought by hundreds of thousands of people who could now course over frozen lakes, fields, and forests of the grand Canadian wilderness. It was also bought by people in carriage businesses like mail deliverers, by country doctors, and by armies for transporting troops. It was also used for hauling pulpwood from forests and for facilitating oil prospecting in the wilderness.
  - Can a frustrated female chemist working in a large company catalyse, through a management innovation, a number of new ventures for the company?<sup>30</sup> Yes, of course. She and several colleagues had been making venture suggestions, but receiving only a perfunctory response from management. With their help, she proposed to management a new system for considering employees' ideas. It involved the preparation of a formal 'Idea Memorandum' by the originator of the idea with the assistance of a facilitator. The memorandum would be reviewed by an internal group of experts, and if the idea was found promising, its execution plan would be developed, involving stages and sponsorship. The lady lobbied several high-level managers, and located a sponsor for her idea. A small 'Innovation Office' was set up, consisting of herself and two part-time facilitators. In five years a full-fledged Innovation Network emerged that had offices in eight of the company's worldwide locations. A dozen successful corporate ventures could be launched through the Innovation Network.

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The world as we know it is unthinkable without entrepreneurial creativity. Every institution we have–school, business, clinic, political party, cooperative, cult, or government–is directly or indirectly the outcome of entrepreneurial creativity. In remote times, someone or the other must have got the idea that education or health or power or security or faith could be better secured through an organization than through a solo or family effort and went about creating an organization of some sort with rules, plans, and control systems, and got the organization going in

the successful pursuit of its goals. Others must have seen the success and followed suit with imitations and variations. Something like the biological process of survival of the fittest may have operated to weed out unviable ventures and perpetuate the viable ones. Environmental and technological changes must have given rise to fresh forms of venture, with further cycles of shakeout and consolidation of forms. The process of proliferation of ventures and survival of the fittest continues today, and indeed, on an ever-escalating scale, given the incredibly vast range of what people want and the global competition for satisfying these wants.

Entrepreneurial creativity is especially important today. We now have an integrated global marketplace, hypercompetition, technological turbulence, and worldwide opportunities. Entrepreneurial creativity is needed to convert these opportunities into productive ventures that can enrich the quality of life through new products, services, and activities.

So how does entrepreneurial creativity work? Let me illustrate some of its mechanisms with the help of an Indian myth. Myths frequently provide powerful cues about human creativity, because they are creative attempts by a collective consciousness to solve difficult, shared problems with the help of both magic and realism. The Indian myth of churning of the ocean provides useful insights about entrepreneurial creativity.<sup>31</sup>

Long ago, the *devas* (gods) and *asuras* (demons) were involved in recurrent battles for supremacy. The gods, especially their head *Indra*, appeared to be losing vigour. Thereupon *Vishnu*, the chief patron of the gods, promised to reinvigorate the gods, and thereby consolidate his position. *Vishnu* cooked up a joint venture of the gods and the demons. The Ocean of Milk was to be churned, with Mount *Mandara* as the churning rod and the snake *Vasuki* as the rope for twisting the rod. Since this was strenuous work, *Vishnu* told the gods to promise to the demons a share of ambrosia that would emerge once the ocean was churned in return for their help in churning the ocean. But *Vishnu* privately told them that he would see to it that the demons did not get their share.

*Mandara* could be used to churn the ocean thanks to the combined might of the adversaries. But the massive mountain began to bore into the bottom of the ocean and might have disappeared. So *Vishnu* became a giant tortoise and balanced the mountain on the tough hide of his back.

The churning of the ocean yielded numerous treasures—*Surabhi*, the marvellous cow; *Varuni*, the goddess of wine; *Parijata*, the tree of paradise; nymphs; the moon; *Laxmi*, the goddess of wealth and fortune; *Kaustabh*, a marvellous jewel; *Airavat*, the white elephant; *Ucchaishravas*, a miraculous horse; and so forth. The gods appropriated all of these, and *Vishnu* seized *Laxmi*, who became his consort.

But there was a mighty flaw that even *Vishnu* had not anticipated. The exhausted serpent *Vasuki* began to spew out deadly, universe-destroying poison. Even *Vishnu* could not handle this. So all

prayed to *Shiva*, the god of both gods and demons, to save them from the calamity. *Shiva* ingested the poison and rescued the world.

Finally ambrosia rose to the surface, contained in a jar, and borne aloft by *Dhanvantari*, the physician. *Vishnu* distracted the demons by turning into *Mohini*, a ravishingly beautiful woman, and enabled the gods to consume the ambrosia. The event is celebrated even today every 12 years at Prayag (Allahabad), the holy city at the confluence of the Ganga with Yamuna, where millions of people turn up for purificatory dips in the waters.

Notice the mechanisms of successful entrepreneurial creativity in this myth: a powerful and resourceful planner of the venture (*Vishnu*); urgent need; the venturer's vision of personal glory and power over the enemies of his wards; astute diplomacy to get the adversaries (demons) to cooperate in a mighty venture; the use of unusual and potent means for the job (the use of a snake and a mountain for churning purposes); unexpected crises (the mountain sinking into the earth's crust, the snake spewing deadly venom) and their highly resourceful resolutions; tricky tactics to pre-empt the benefits of the venture; a reasonably fair distribution of the profits of the venture among the original organizers of the venture; and the consolidation of the power and position of the prime entrepreneur (*Vishnu*) through highly capable management.

Let us now turn to some research evidence for insights into contemporary entrepreneurial creativity. Much of it deals with entrepreneurial business ventures. But it can yield mechanisms that can be utilized also by non-commercial ventures. These mechanisms can also be relevant to intrapreneurial ventures, that is, ventures launched by a person or a team called intrapreneur from within a system, such as a corporation or a government.

There are two contrasting kinds of entrepreneurs–(1) ordinary businessmen who either cannot hold jobs or do not like to work for others and therefore start their own businesses and (2) entrepreneurs who have a vision of grandeur or distinctive achievement, and create an enterprise around an innovation or a novel idea. The first type may occasionally get lucky and make it big; more frequently, however, he or she is fated to a marginal existence and small pickings.<sup>32</sup> The second type is an innovator and a calculated risk taker, and sometimes stumbles through miscalculation, but more frequently succeeds and grows, provided appropriate mechanisms are utilized.

Mathew Manimala's study of 164 Indian and Canadian entrepreneurial business ventures yields a number of useful mechanisms of successful creative entrepreneurship.<sup>33</sup> He compared the policies and strategies employed by 52 pioneering and innovative (high PI) entrepreneurs with those employed by 46 low pioneering and innovative (low PI) entrepreneurs. The high PI entrepreneurs were those businesses that utilized a variety of innovations related to products, processes, markets, inputs, and modes of management. The low PI entrepreneurs either did not

use innovations or used them much more sparsely. There were major differences in the strategies and policies of the two groups. The high PI group stressed much more the following.

- Idea sources Much greater awareness of technological developments abroad; investment in acquiring special talents and research-based know-how; learning from the unsuccessful ideas of others; keeping abreast of changes in the business environment.
- Idea development Stronger reliance on internally developing venture ideas than on borrowing them from others.
- Criteria of choice Initiatives chosen on the basis of the entrepreneur's vision and goals and not just on the basis of opportunities encountered.
- **Persistence with ideas** Greater persistence with goals and visions, and flexibility regarding the means for achieving them.
- **Success management** Striving for excellence through new ideas rather than the repetition of strategies that yielded success in the past.
- Venture autonomy Stress on building up internal capabilities and resource base before seeking technical collaboration or financial participation of outsiders—a strategy of partnering from a position of strength.
- Management of competition Avoidance of competitive pressures by creating new products and markets and through backward and forward integration; greater emphasis on quality and reliability of products and services, customer service, and on seeking from the customer advice and suggestions.
- **Growth strategy** Avoidance of imitating the growth path of others; instead, greater stress on starting from scratch, mastering the business, and then growing organically as per available resources and capability; greater stress on related diversification; greater stress on professionalization of management and decentralization as business size increases.
- Human resource management Greater reliance on experts and stakeholders, on delegation of authority but coupled with accountability, on looking after the staff, on sharing of the gains of business with all the stakeholders.
- **Risk management** Reduction of risks of initiatives by pilot testing; calculated risk taking; hard work for getting all the needed information.
- Networking Greater stress on getting visibility and on networking with useful people through honorary public service, induction of reputed and influential people on the company board, bailing out friendly concerns, etc.

What powers venture creativity? Several Canadian studies provide useful insights.<sup>34</sup> In a study of 39 founders of technological-innovation-driven manufacturing units, researchers found that most were well-educated (usually with a technical degree), and first acquired sufficient working

experience and technological expertise, mostly through jobs in large companies. Then, around the age of 35 to 40 years they began to look for an entrepreneurial venture. They came from stable family backgrounds and had stable religious affiliations. The fathers of several of these ventures were self-employed. "Typically, the entrepreneur, in the course of his work for a large company, spots some trend or some promising new invention; or spots a gap which he figures out a way to fill. In a large proportion of the cases (83%), the entrepreneurs indicated that their former companies would not have allowed them to exploit their ideas. So they struck out on their own."<sup>35</sup> These earthy entrepreneurs therefore first built up intellectual capital and managerial capabilities, spotted a good opportunity, and then turned into entrepreneurs.

In another Canadian research, 41 lab workers were compared with 41 former lab workers who had become entrepreneurs. The entrepreneurs revealed higher levels of drive to succeed; their risk-taking propensity was twice as high; they were also higher on sensation-seeking; and they were lower on the need for affiliation with groups and were more aggressive.

A third study, of 7 Canadian technological-innovation-based entrepreneurs, indicated some further traits: they were highly determined; highly committed to being innovative; and had an abiding vision of building up a grand organization or a grand product.

The creative entrepreneur's job is a 24-hour, 365-days-a-year job. An innovative entrepreneurial venture requires a huge expenditure of energy during its set-up and its early years of struggle for survival. What makes the entrepreneur pour out all his or her being for the success of the venture? Teresa Amabile has suggested that the entrepreneur is primarily driven by passion and intrinsic motivation, although positive signals of success while operating the venture (such as profits and growth and public acclaim) would be very welcome.<sup>36</sup> In a study comparing intrapreneurs (that is, heads of autonomous business units within a corporate setting) with ordinary managers, cash bonuses and stock options were found to affect the performance of the intrapreneurs positively, as also, of course, the autonomy they enjoyed in engaging in projects of their own undertaking.<sup>37</sup>

Successful entrepreneurial creativity may well require a personality profile that has some unique features compared to creative artists and scientists. An entrepreneur may be a visionary and an innovator. But the entrepreneur also needs to be tough, flexible, highly practical, and hard-headed to ensure the successful launch of the venture. He/she also needs to be effective at managing the venture and its growth; and he/she needs to be highly resourceful. A study of 37 outstanding Irish business innovators and entrepreneurs indicated that the more original of them tended to be dominant, power-oriented, macho types, fundamentalist in their religious beliefs, free from mental pathologies, rather assertive, somewhat cynical, tough, strong, daring, independent, blunt, bossy, distrustful, and pushy.<sup>38</sup> There was relatively little that was pleasant or mild or modest or unselfish or empathic about them. But they were not rigid or stubborn. They were flexible, quite independent in their thinking, and unconventional as businessmen, with a

strong sense of destiny and a strong sense of personal identity, authenticity, and self-acceptance. They also had broad interests, unending curiosity, and were observant, perceptive, and reflective.

## **EMPOWERMENT CREATIVITY**

If existential creativity is primarily concerned with the development of one's own creativity, effectiveness, and self-actualization potential, empowerment creativity is concerned with the development of the effectiveness, creativity, and self-actualization potential of others. These

'others' may be one's spouse, children, other relatives, or friends; one's colleagues, subordinates, or customers; fellow citizens, the disadvantaged, and others in whose life, one feels a stake. This is a very distinctive kind of creativity because powering it is often a strong altruistic motivation, a sense of mission, empathy, and an exalted understanding of humanhood.

There is an important social dimension to empowerment creativity. In a world dominated by a market economy, the bottom 20% of the population is likely to get the wrong end of the stick. These are the poor, the handicapped, the unskilled, the diseased, the old, or the otherwise disadvantaged. Worldwide, these may total a billion. Who would look after them? In the developed economies, there is a welfare state that partially takes care of these. But in poor countries without a welfare state who would hold their hand, give them skills, Goodness is the only investment that never fails Henry Thoreau A non-violent revolution is a

program of transformation of relationships Mahatma Gandhi

give them the opportunity to live decently and in dignity? Individuals and civil society institutions need to supplement the government's efforts. The task is gargantuan; the resources are limited. Empowerment creativity becomes critically important (see box on *Angels of Empowerment*).

Human empowerment is an inherently creative field because there can be no standard ways for engendering human growth. Also, there are numerous facets of human empowerment. Consequently, there are numerous approaches to human empowerment. Some deal with poverty alleviation; some with the fragile health of the impoverished; some, especially at the level of the state, involve empowerment of people through rights and entitlements; some seek to empower the marginal people through education and skilling; some are inspirational in character and seek to raise the aspirations of the timid, the alienated, or the indifferent through transformational leadership; some are aimed at conscientization, that is, at making people aware of the social forces in their life situation that restrict their autonomy and creative potential; some facilitate collective action for meeting shared aspirations; and some more aim at the fundamental transformation of human nature. Let us take a quick look at these various approaches.

### **Angels of Empowerment**

Here are some relatively obscure angels who have given their all to the empowerment of the disadvantaged through innovative means.

- Eliazar Rose ran the New Hope Leprosy Trust in a poor district of Orissa, south-east India. As of the mid-1990s, New Hope covered nearly 1900 villages and cured 3000 lepers and was treating 2500 more.<sup>39</sup> The approach was innovative. Instead of herding leprosy patients into leper colonies, villagers were educated to take care of their leper relatives in their homes. Rose had known the pain of ostracized lepers. Both his parents were lepers, who inspite of being cured had to live in a lepers colony shunned by society. Rose was brought up in an orphanage, and his mother had to beg to send him money. To create an awareness that leprosy is curable and not as contagious as lay people think it is, New Hope employed tribal girls, who went from house to house to educate people about leprosy and detect new cases, if any. New Hope diversified into reconstructive surgery for lepers with damaged hands, treating the elderly for cataract, and children for night-blindness. The clinic also tackled complicated pregnancies. Polio-afflicted children were trained to make callipers for gainful employment. A cooperative bank for poor women was formed to extend micro-credit to needy women. Community gardens were popularized to enable villagers to produce Vitamin A concentrates cheaply. A free school was started. So successful was New Hope that it was permitted by the government to manage a state-funded leprosy treatment programme. What motivated Rose? His childhood agonies, faith in God, and the smile on the face of a cured leper!
- What can a busy senior police officer do for the homeless children of a metropolis? Much. Amod Kanth, in the mid-1990s an additional commissioner of Delhi police, acted as an elder brother and guardian of some 3000 rag pickers, shoeshine boys, beggars, and so forth whose homes were Delhi's streets.<sup>40</sup> With the help of a number of agencies, an institution called Anupam Prayas was founded in around 1989 to care for juvenile delinquents. There were only 25 child members then, a number that grew to 3000 seven years later, with 17 care units in the city's various

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Existential, Entrepreneurial, and Empowerment Creativities

slums. The NGO provided non-formal education, vocational guidance, medical services, and mid-day meals. It was on the verge of providing a shelter—the first of its kind in Delhi—for the homeless children, with the help of a substantial government grant. Voluntary psychologists and counsellors helped in identifying the children's aptitudes and skills. Training was provided in such areas as cosmetics, embroidery, tailoring, block printing, book-binding, auto repairs, and candle making. Some of the girls graduated from being rag-pickers to working in some of the best beauty parlours in Delhi. 3000 is but a cipher in India's horde of millions of homeless children. But Kanth stood tall as a symbol of the creative force that can be set in motion once a human turns humane.

• Harnath Jagawat and his wife Sharmishta have literally transformed the lives of tens of thousands of tribals.<sup>41</sup> Earlier the personnel officer of a big business group (Mafatlals), Jagawat helped set up a foundation called Sadguru. It was committed to empowering tribals through water harvesting in three drought-prone districts in western India. Sadguru started building check dams and mini-lift irrigation schemes in villages. Sadguru provided the money while the villagers provided the labour for building the works. What is more, Sadguru trained the villagers to manage and maintain these works. By the mid-1990s, over 120 lift-irrigation projects and 90 check dams had recharged 10000 wells and brought 80000 acres of land under irrigation. Thanks to these efforts, seasonal migration of tribals to cities declined from 80% to 10%, and many villagers were able to grow three crops a year. Besides water harvesting, Sadguru planted over 22 million fast-growing trees that provided fuel and other wood products to the villagers. Over the years Sadguru built up a team of 100-odd engineers and other socially committed professionals. Some 1500 additional dams were in the offing.

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### **Empowerment through Poverty Alleviation**

Poverty, goes a Sanskrit *mantra*, is a blemish that can destroy a whole pile of virtues, much in the way the moon destroys the light of the sun during an eclipse. Poor people all over the world frequently fall victim to extortionist moneylenders. In India, a poor person who borrows money

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at a usurious rate of interest not only remains indebted all his/her life but his/her descendants may also remain indebted. The moneylender not only bleeds the borrower white, but frequently seizes his land, and turns the borrower into a bonded labourer. Under the leadership of Mohammed Yunus, Bangladesh's Grameen Bank showed how creatively the poor could be funded for their projects and empowered in numerous ways.<sup>42</sup> The micro-credit programme was started in 1976. By 1988, the Grameen Bank had extended small loans to some half-a-million very poor households in 10000 villages to finance income augmenting activities. The bank charged a commercial rate of interest, and yet managed to recover its loans and interest almost 100%. It used some innovative methods. It provided small loans primarily to women (who tend to be more conscientious than men when it comes to repayment) and got the entire family to guarantee repayment. Besides disbursing funds, the bank encouraged its customers to practice sanitation, health care, nutrition, family planning, etc. (for which information was made available), and made seeds and chemicals available at reasonable prices. Evaluation studies have indicated that the bank has helped to raise the incomes of the poorest, and its experiment may well be the most effective rural poverty reduction programme in the world.

### **Empowerment through Better Health and Population Control**

The poor have significantly shorter life-spans than the better-off people, mainly because of malnutrition, too many offspring, and inadequate medical treatment. Led by the Aroles, the Comprehensive Rural Health Project at Jamkhed in Maharashtra (western India) has successfully altered the health and health-related attitudes of 200000 rural poor living in 129 villages.<sup>43</sup> Jamkhed utilized professionals as well as propaganda for the purpose. The project led to better nutrition, a better understanding of diseases and their control and prevention, widespread family planning, and the discarding of harmful practices and taboos relating to leprosy, snake bite, etc. Family planning among the impoverished is an important way of improving the health and welfare of the family, especially of the mother and the children. The Population Programme of the Indonesian government innovatively lowered the high birth rate of this Muslim nation.<sup>44</sup> Some of the Muslim religious leaders were sent to Egypt and other Muslim countries where population control had been accepted, and they announced that population control was not against the tenets of Islam. The programme harnessed the *Mahabharata* and the *Ramayana*, two Indian epics that are very popular in Indonesia. Spearhead teams would go into villages, attract audiences through songs and dances pertaining to stories from the epics, and then provide the population control message and set up a village family planning group to persuade the locals to adopt family planning and educate them in family planning practices. By 1978, the programme had set up 3000 clinics, recruited 7000 workers, and organized 25000 village family planning groups to provide contraception-related services to villagers. By March 1979, 13 million new acceptors of family planning had been recruited, and about one-third of the married women in the reproductive age were using contraception. This led to a perceptible fall in the birth rate.
#### **Empowerment through Conscientization**

Paulo Freire, a radical Christian priest, developed a pedagogy for emancipating the oppressed.<sup>45</sup> The oppressed, such as the poor, the lower classes and castes, and women in a male-dominated society, often take for granted their life situation as God-given or fated, and so do precious little to improve it. The pedagogy of the oppressed makes them critically aware of the man-made institutions that hold them in thrall, and then how, through collective action, they can bring about changes in these institutions to liberate themselves. In Guinea-Bissau, a former Portuguese colony in West Africa, Freire and his colleagues were invited to contribute to the national adult literacy programme.<sup>46</sup> Instead of strengthening the elitist educational system installed by the Portuguese, Freire and team tried to utilize the strengths of native wisdom and culture, and incorporated in the educational programme a critical awareness of oppressive social conditions such as low status of women, learned helplessness in the face of natural calamities, and submission to the oppression of tribal chiefs. The team also encouraged cooperative production, solidarity, and learning from work and the application of this learning to work-related situations.

#### **Empowerment through Collective Action**

There is power in numbers, and that power is magnified when the group is properly organized and led. The fact is that in many countries unions of employees have been able to wrest from management better pay, working conditions, job security, incentives, training and development facilities, fair appraisal and promotion, and many perks. Lenin once asked, "Can a hundred be more powerful than a thousand?" He also gave the answer, "Yes, they can be, provided they are organized."

Very effective and innovative has been the unionization of poor, self-employed women by the Self-Employed Women's Association (SEWA), based in Ahmedabad (western India) and led by Ela Bhatt.<sup>47</sup> The impoverished, self-employed vegetable vendors and the like, mostly women, are exploited by everybody-husbands, policemen, wholesalers, and customers. Ela Bhatt realized that they had to be unionized for their protection. But only the unions of employed persons were recognized. With a band of committed fellow workers, she did what no one else had done. She created a union of the self-employed. By 1989, the membership rose to 30000. Its members were vendors of fruits and vegetables and *beedi* (an indigenous cigarette), milk vendors, processors of agricultural products, agricultural labourers, and so on. The union won many victories against the police, the municipal authorities, and businessmen. SEWA went much further. It diversified into cooperative banking; the marketing of various craft products, quilts, block printing, furniture, cane products, and handloom cloth; and various marketing services. It offered a variety of services for the self-employed, such as health care, maternity benefits, child care, family welfare, life insurance, housing, sanitation, legal aid, etc. It published a magazine, made video productions on women's issues and problems, ran a polytechnic and a school for training in constructive

unionism and cooperation, and also conducted research relevant to its activities. It played an advocacy role in the framing of public policy. It turned into a federation, its members being SEWA-type organizations formed all over India. By 2000, the collective membership was around 200000.

#### **Empowerment through Education and Skilling**

Studies indicate that one of the best investments a poor country can make is in giving kids and illiterate adults literacy and at least primary education.<sup>48</sup> The social return on public investment in primary education has been estimated to be 18% per annum, and the return to those receiving this education, 29% per annum! Literacy for the poor opens many gates–better jobs, skilled vocations, business, better ways of living, better upbringing for children, better health, etc. Higher education, too, is a powerful mode of empowering people. Mexico's Conafe programme, led by a dynamic industrialist named Prudencio Lopez Martinez, was launched in the early 1970s as a major national rural educational programme.<sup>49</sup> Conafe recruited some 19000 instructors, mostly with rural backgrounds and selected for their motivation, one for each rural community. Local control over them. The curriculum was designed keeping in mind both national standards as well as the local context. Some 350000 of the poorest children got education that they might not have got otherwise. What is more, their performance on the national elementary school test was on par with the performance of children in the urban oriented elementary education programme.

#### **Empowerment through Training to Learn and Innovate**

There is a Chinese saying to the effect that if you give people food they may last a year, but if you teach them how to sow and reap they would last a lifetime. Today, thanks to the fast pace of technological change, specific knowledge and skills have a relatively short shelf life. But if people are taught how to learn and how to find creative solutions to vexing problems, they could upgrade themselves whenever their capabilities become obsolete. Learning how to learn involves certain capabilities and attitudes. Questioning taken for granted or unquestioned presumptions is a powerful way to learn how to learn. Keeping abreast of the developments in one's field helps. Interacting with the knowledgeable helps. Ability to define problems well, and having done so, brainstorm for creative solution helps a great deal. Contact with ground realities, planning appropriate actions, executing them in a time-bound manner, reflecting on the experience for lessons, and incorporating these learnings in future action are others.<sup>50</sup> Constantly benchmarking oneself with the best is another useful learning device that uncovers gaps and prompts one to close them. Seeking frank feedback from experts – rather than just praise – about one's performance is another powerful learning mechanism.

The Social Work and Research Centre at Tilonia village in Rajasthan (western India) provides an innovative example of how the rural poorest as well as their professional mentors can be helped to learn how to learn.<sup>51</sup> Tilonia services only the poorest and therefore frequently has landed itself into fights with the better-off. It seeks to integrate urban expertise with rural skills and wisdom. It works by getting the poor to take charge of their own development and pick up vital learning skills in the process. It typically identifies local people with usable skills, helps them to upgrade them, and then puts these people in charge of activities. Tilonia uses many professionals, such as engineers, but takes care that they unlearn their city-bred fads. For instance, a new recruit is expected to sit around in the local tea stall and listen to the local talk to learn what life is like in rural areas and what concerns the poor have. The professionals provide assistance to the local leaders in charge of activities. As a consequence, the locals as well as the professionals have developed expertise in groundwater location and use, school education, sickness prevention, women's welfare, agricultural extension services, animal husbandry, appropriate energy technologies, communications, training, and rural industries.

#### **Empowerment through Transformational Leadership**

Transformational leadership is not bossy, command-and-control leadership. Nor is it manipulative leadership that seeks to buy support or bribe away opposition. Bernard Bass, one of the American pioneers in the study of transformational leadership thought of it as a way 'followers' are enabled to look beyond their narrow self-interest to larger concerns so that they would willingly make heroic contributions.<sup>52</sup> This happens when the leader embodies values, ideals, a noble mission, or a grand vision of excellence that resonates with the core beliefs and convictions of the 'followers'. Warren Bennis and Burt Nanus thought of the transformational leader as one who gets even apathetic people committed to action, converts followers into leaders, and leaders into agents of change.<sup>53</sup> Transformational leadership is not a one-way process. It is, as James Burns believed, an interactive process in which the leaders and the followers raise one another to higher and higher levels of morality, motivation, and creativity.<sup>54</sup> Pritam Singh and Asha Bhandarkar, writing on transformational leadership in the Indian context, emphasized the role of sincerity of the leader and the leader's commitment to the growth and development of subordinates.55 They also identified several other traits of the transformational leader-ability to create warm, family-type culture at work; consultative and participative decision making; emphasis on teamwork and the 'we' spirit; encouragement for the initiatives of the subordinates; behaviours that turn the leader into a role model that subordinates can look up to; equal emphasis on innovation, and respect for the best traditions and past practices. There is some evidence that groups with transformational leaders generate more original solutions and elaborations of ideas than groups without transformational leadership.<sup>56</sup>

Transformational leadership differs sharply from charismatic leadership. Charismatic leadership turns followers into dependent, drooling hero-worshippers who obey their leader unquestioningly. Transformational leadership is empowering leadership that inspires the timid to be brave, the alienated to be committed to a cause, and, as Bennis and Nanus put it, converts even indifferent followers into responsibility-taking leaders. Stalin and Hitler were charismatic leaders but Roosevelt, Churchill, Gandhi, Martin Luther King, and Nelson Mandela were transformational leaders who lent a hand to the tottering and made them walk erect.

Transformational leaders can be found in every walk of life—in parenting, at school or college, in politics, in business, in social work, in scientific and artistic communities, and in various professions. They do not need to be great in looks or money or power or fame. But they need to have a core integrity, commitment to something truly worthwhile, a communicative ability to reach the minds and hearts of others, and warmth that draws people to them (see box on *Two Transformational Leaders*).

#### **Empowerment through Transformation of Human Nature**

Empowerment is not merely more money, power, capabilities, status, autonomy, or self-actualization. It can also mean the transformation of human nature from greed and selfishness to selflessness, helpfulness, love, concern for all the living, and spirituality. It can be an ascent from our animal nature to our divine nature. Over the centuries, this miracle of transformation has been repeatedly attempted in varying degrees of success by gurus and sages like the Buddha, Socrates, Confucius, Mahavira, Jesus, and in our times by Albert Schweitzer, Mother Teresa, Ramakrishna Paramhansa, Sri Aurobindo, Ramana Maharshi, and Mahatma Gandhi. How does this transformation work? It is largely an interaction between an evolved soul and a spiritually troubled aspirant dissatisfied with the mundane. Faith is involved, as also spiritual technologies, such as the various paths of yoga and meditation. A reinforcing reference group for the aspirant also helps. The milestones of change in one's nature are internal-calming of the mind, calming of desires, greater empathy and love for the living, visions, states of samadhi or bliss. Such a transformation for us is very quickly becoming a necessity. Lethal weapons are spreading far and fast, so that many countries have, or are developing, the capability to end humanity. The danger is not from the weapons but their wielders mired in selfishness, greed, and destructiveness. Innovative means must be found to replace these traits with benign sentiments (see box on Crafters of Human Transformation).

#### **Two Transformational Leaders**

#### SUSAN ANTHONY

If the better half of humanity has the vote, it is largely because of the lifelong and untiring efforts of an American school teacher named Susan Anthony.<sup>57</sup> The mid-19<sup>th</sup> century America was not far ahead of Taliban Afghanistan. "Only one college in the United States admitted women; there were no women doctors or lawyers in the country. Married women literally 'belonged' to their husbands as slaves or chattels. If they earned money or inherited it, legally it was not theirs but their husbands'. Single women had to be represented by male guardians. Obviously, no woman was entitled to vote."<sup>58</sup>

Susan Anthony was born in 1820 in a liberal Quaker family. She had great curiosity and urge to learn. When she was 18, her father went bankrupt and Susan became a teacher. In one of her teaching jobs, she experienced severe gender discrimination—her salary was a quarter of the male she replaced. She was drawn to the temperance movement in a hard-drinking America, and here she honed her leadership skills as a speaker and a writer. Then she followed her friend Elizabeth Stanton into the fight for women's rights. Her first victory was in getting the New York State Teachers' Association to vote in women's equality in the running of the organization. It took a 10-year fight to get the New York State legislature to allow a married woman to control her own property and earnings. There were, of course, merciless attacks on her by male chauvinists. The American Civil War gave her the opportunity to demand freedom not only for the slaves but also for women. Many women joined the movement. The slaves got the right to vote, but not women. She edited a newspaper, whose motto was "Men, their rights, and nothing more; women, their rights, and nothing less." The paper failed. She voted in an American presidential election, was tried for violating the Constitution, and fined. She refused to pay. During these years of the women's suffrage struggle, she worked on the five-volume History of Women Suffrage. Almost all her meagre earnings were used for the cause. On her first ever vacation at 63 years of age she went to Europe and got an enthusiastic welcome from the feminist movement. In 1904, the International Woman Suffrage Alliance was formed, with Susan Anthony as its undisputed leader. She died at 86, and her country flew its flags at half mast. She was euologized as the champion of a lost cause. Her victory came 13 years after her

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death. In 1919, an amendment to the US constitution, called the Susan B. Anthony Amendment, gave full citizenship rights to women. Since then, women all over the world have not looked back. Their empowerment owes more to her than perhaps to anybody else.

#### SUN YAT-SEN

Sun Yat-Sen, later hailed as the father of the Chinese Republic, was born in 1866 in a village in the family of an illiterate Christian farmer.<sup>59</sup> China, riddled by corruption, fights, conspiracies, and the greedy machinations of imperialist Western powers, was clearly going downhill. From the beginning, the boy wanted to do something different, and was drawn to the stories about the Taipings, who opposed the warlords, were monogamous, disliked slavery, and bowed to nothing but the cross. At 14, he was able to get away to Honolulu where an elder brother had settled. He worked in his brother's store and also went to a Church of England school. He was sent back at 17. Back in his village, Sun Yat-sen rebelled against fetishism, idolatry, ancestor worship, and superstitions. He was banished, but later recalled for marriage. In Hong Kong, he was outraged by the practice of parents selling their sons into slavery and daughters into prostitution. The rampant corruption and the ineffectual, cowardly rulers of China also outraged him. He studied medicine but also engaged in clandestine activities, propaganda, and revolutionary activities. At 29, he coined a motto: "The Earth, the Universe, belongs to Everyone." He organized a group called Dare-to-Dies. But the plot was discovered and the members were executed save Sun Yat-sen, who managed to escape. In the meanwhile, he had become acquainted with a Chinese industrialist named Soong, whose US-educated daughter he later married. Soong clandestinely published inflamatory material for overthrowing the government.

Now a fugitive, Sun Yat-sen went back to the West to raise funds. He was kidnapped and held in the Chinese Legation in London, but released under public pressure orchestrated by his former professor, an Englishman. This episode made him famous. He went to Japan, then to the South Sea Islands, a hunted man. But he kept in touch with rebellious military men and underground workers. The Chinese revolution occured in 1911, the monarchy

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was overthrown, and Sun Yat-sen found himself appointed the first president of the new republic. A year later he persuaded an influential liberal statesman, Yuan Shih-K'ai to replace him as president, since he felt that Yuan was more qualified for the job than himself. But Yuan proved to be a dictator. There was a break between the two, and in a pitched battle Sun Yat-sen was defeated. Sun Yat-sen fled to Japan. But Yuan died, and Sun Yat-sen returned to a divided and lawless country. In 1920, he once again became president with the help of a south Chinese warlord. The two, however, fell apart, and Sun Yat-sen fled. He sent his assistant Chiang Kai-shek to Russia to learn from the Soviets, and organized his party Kuomintang along Communist lines. But the country descended into civil wars and anarchy. Deeply disappointed, Sun Yat-sen died in 1925, hailed as the father of the Chinese republic. Although he succeeded only partially in his life's mission, he stirred the youth of China as nobody else had, and laid the foundations of radical change in an ancient and decrepit land.

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## **CONCLUDING COMMENTS**

On the face of it, venturing, existential, and empowerment creativities are unrelated. In reality, the relationship can be profound. Venturing is taking initiative, prodding the context to yield treasures. When reflection is allied to initiative taking, it can yield wisdom and personal growth. That is, it can yield existential creativity. When existential creativity is allied to humaneness, it can yield empowerment creativity. To put it differently, existential creativity without venturing may be stillborn; and existential creativity that does not blossom into empowerment creativity would be like a tree with blossoms that yield no fruit. As a race, we need to invest not only in each of these forms of creativity, but also in their complex relationships. That is the path to our evolution. It may also yield elixir for each one of us.

In the next chapter we take up an important issue: how do we raise the quality and impact of our creativity?

#### **Crafters of Human Transformation**

SWAMI VEVEKANANDA

Swami Vivekananda, the prime disciple of Ramakrishna Paramhansa–who many believe was an incarnation of God–founded the Ramakrishna Mission to spread far and wide the voice of his master and to serve the poor and the suffering.<sup>60</sup> His master had personally experienced the spiritual unity of all faiths. In succession, he had followed the Hindu spiritual paths of devotion, ritual, and knowledge, the spiritual paths of Christianity and Islam, and found that each path led to the direct, living experience of the Sublime. He had reached the firm conviction that God was attainable by everyone, was not the property of any single religion, and that spirituality was the only creative salvation for a misery-ridden world.

Though Vivekanda surrendered himself totally to his master (but not without a prolonged struggle), he retained his rationalism. Born in Kolkata (India), Narendranath, the son of a thriving lawyer, grew up to question all dogmas and mumbo-jumbo. Eloquent and with a penetrating mind, his memory and grasp were uncommon. At college he studied logic, Western philosophy, and history. He was attracted to the Brahmo Samaj, which disdained rituals, image worship, and religious orthodoxy, and encouraged its members to adore the one true, eternal God. But Brahmo Samaj could not fully satisfy his yearnings. He landed up at Dakshineshwar, where Ramakrishna lived, and asked him point-blank: "Sir, have you seen God?" The answer was crystal clear. Yes, indeed, he had, as clearly as he could see Narendranath. Narendranath was closely associated with Ramakrishna for five years, until Ramakrishna's demise.

Narendranath, now Swami Vivekananda, became a wandering monk, and saw everywhere the appalling misery of his countrymen. He saw God struggle in humanity. Meditating at Kanyakumari, the southern-most tip of India, Vivekananda got an intimation of his missions. One was to elevate the masses by serving the poor; the other, to propagate the message of his master to humanity.

Thereafter, his first major step was to leave India in 1893 to attend the Parliament of Religions in Chicago. There, he electrified the audience of thousands by his exposition of Hinduism and Indian spiritual thought. He stayed on in America for three years, travelling

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constantly, teaching and speaking. He founded the Vedanta Society. He also went to England. He accepted several disciples in both the countries. On his return to India in 1897, Vivekananda found himself a hero, facilitated all over India, spreading his message everywhere.

In 1898, the Ramakrishna Mission was founded, and over the years, its branches were formed all over India and in the UK and the US. It has propagated Indian spiritual thought far and wide. The Mission has also rendered great service in calamities like famines, epidemics, earthquakes, communal riots, and so forth. It also runs schools, health clinics, places of worship, monasteries, and other facilities. The devotees of the Mission are in the millions. It has creatively addressed a weakness of Hinduism—an excessive emphasis on personal salvation without sufficient concern for the wounds of the flesh all around.

Vivekananda emphasized strength, discipline, and faith in oneself and in God. He galvanized a sleepy nation by the power of his words and deeds. He used to call for muscles of iron, nerves of steel, and gigantic, unstoppable wills. He died young, at the age of 39. But he still stirs us with his cry: Awake! Arise! And stop not till the goal is reached!

#### SRI AUROBINDO

Sri Aurobindo was born Aravinda Ghose in 1872 in Calcutta. His father, a medical doctor who was educated in Britain, was so Anglicized that he tried to bring up his sons to be *pucca* brown *sahibs*. Aravinda was first sent to a school in India for British children, and then to school and college in Britain for 13 years. But instead of getting Anglicized, Aravinda returned to India to discover his motherland and its people. He confronted the alien and made it intimate. Aravinda compressed many lives into one. In turn, he served as a functionary of the Maharaja of Baroda; became a professor; turned an editor and pamphleteer advocating the independence of his beloved country from British rule; became a radical who fomented secret revolutionary activities; wrote *Savitri*, a long poem about human transformation; became Sri Aurobindo the sage, and dreamed of a new race of superhumans.<sup>61</sup>

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Aravinda was arrested in 1908 for radical activities and tried. He was jailed and in the jail he had a spiritual revelation. He was acquitted, but fearing continuing persecution, left incognito for the French coastal enclave of Pondicherry in south India. There he settled and commenced his *sadhana* (spiritual quest).

Sri Aurobindo yearned to bring about man's transformation into superman. He believed that man was evolving towards a higher and larger consciousness, and would go beyond mere intellectual development to a spiritual development. To put his ideas about spiritual evolution into practice, he started the Pondicherry *ashram*. In this work, he was joined by a French woman named Mirra Richard, later called the Mother, as also many others. The *ashram* was a sort of training camp in which the inmates would be readied to access the cosmic supermind, and receive it when it chose to descend. The *ashram* is a remarkable place in which the inmates exercise both great freedom and great voluntary discipline. The spiritual path is a personal affair, although catalysed by a study of the teachings of Sri Aurobindo and the Mother. Children who are educated in the *ashram*'s school have a wide choice of what to study and from whom. The school stresses all round development, and the physical development and well being is stressed as much as the mental, artistic, and spiritual development. Nearby, an international community of people influenced by Sri Aurobindo has come up, called Auroville.

After 1925, Sri Aurobindo withdrew from all active involvements with the outside world. He passed away in December 1950. Even after his death, the hundreds of thousands of his followers all over the world claim to feel his presence calming and steadying them, urging them towards a divine consciousness and the transformation of their species nature. As one of the verses in Savitri proclaims:

> Yet shall truth grow and harmony increase The day shall come when men feel close and one

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#### FRANK BUCHMAN

Frank Buchman, the founder of Moral Re-armament (MRA) was born of Swiss ancestry in the Pennsylvania countryside, 1878 vintage.<sup>62</sup> He absorbed from his parents and his community an abiding faith in Christianity. He created the Oxford Group and the MRA to fight godlessness, selfishness, and totalitarian regimes of the Left and the Right. As the preamble to the articles of incorporation of MRA in the US proclaims: "... Our learning has been the truth as revealed by the Holy Spirit. Our security has been the riches of God in Christ Jesus...Our joy comes in our common battle for a change of heart to restore God to leadership. Our aim has been the establishment of God's Kingdom here on earth in the hearts and wills of men and women everywhere, the building of a hate-free, fear-free, greed-free world..."

After graduating, Buchman went to live in the poorest quarter of Philadelphia, where he founded a hospice for orphans and destitute boys. Later, he was appointed leader of Christian work in the State University of Pennsylvania. There his mission in life began to get clearer. In 1921, he resigned from his post and never drew a salary again. In 1928, he formed the Oxford Group to turn his solo pursuit into a collective pursuit. Buchman became a globe-trotter to spread his message of Christian love and brotherhood and spiritual transformation. Hundreds of the believers also travelled far for the same purpose. They constituted a 'Christian democracy' on the move. During the depressed 1930s, when Nazism and Communism raged in Europe, he formed the MRA to create a power strong enough, as he put it, to change human nature and build bridges between man and man, faction and faction. He proposed to remake the world in the image of his Maker and his Saviour.

MRA utilized some interesting mechanisms of conversion. The 'house party' was one of them. Small groups of people, powerfully influenced by the MRA's exhortation of absolute honesty, absolute purity, absolute unselfishness, and absolute love, confessed their sins and shared their torments. Thus cleansed, they became soldiers in the MRA cause. 'Quiet time' was practised by the members to still the mind and listen to the promptings of the still small voice. Dialectical plays were produced, seen by thousands, in which selfishness was pitted against goodness, and, of course, the latter triumphed. Interventions were made in

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industrial relations disputes to resolve them on the basis of the idea that there is plenty to meet human need but never enough to meet human greed. The message was spread through round-table conferences, world assemblies, and the training centres at Mackinac Island in the American state of Michigan and at Caux in Switzerland. Leaders of society and youth were especially targetted for conversion. For this work, he was, of course, reviled by the Left and the Right.

Buchman spiritually re-armed hundreds of thousands. Like the other Frank of the 12<sup>th</sup> century Assissi in Italy, he turned into a rekindler of human spirituality through personal charisma, a self-cleansing programme, organizing genius, and social interventions to resolve conflicts by transforming greed into selflessness.



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I. Are empowerment creativity and entrepreneurial creativity nothing but forms of existential creativity?

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2. Do you see any relationships between the history of your country and people's entrepreneurial, existential, and empowerment creativities?

3. Is there any relationship between the roots of creativity discussed in earlier chapters and existential, empowerment, and entrepreneurial creativities?

#### MENTAL GYM

Ι.

Compare the creativities of Mahatma Gandhi, Mother Teresa, Albert Einstein, Henry Ford, and Rabindranath Tagore. What do you see as their similarities and differences?

2. Recall a good deed you did. How did it affect you? Give a creative account of the good deed and its impact on you.

3. What art or writing has affected you profoundly? Examine its impact on your existential and empowerment creativities?

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# 8

# Quality of Creativity



In earlier chapters, we reviewed six different forms of creativity, namely, essence elaborative, expressive, existential, entrepreneurial, and empowering. How do we assess the quality of any form of creativity? The problem is a practical one. There are many situations in which the creativity of an effort needs to be assessed, as in various suggestion schemes, product or process improvement reward schemes, in the classroom, in creativity competitions, and in learning situations in which the creators need to be given feedback as to how good their effort is so that they can do better. We know, of course, that anything creative must satisfy two criteria, namely, originality or novelty and appropriateness or usefulness. As Russell Eisenman succinctly put it,

"...creativity is originality plus usefulness...".<sup>1</sup> But there is a large amount of subjectivity in our assessment of how creative and how appropriate any creative work is. Are there ways of making these judgements more objective or fair? Are there other criteria besides novelty and appropriateness that we could use for making the evaluations of creativity efforts more fine-grained?

Either dance well, or quit the ballroom Greek proverb

#### **CRITERIA FOR EVALUATING CREATIVITY**

A number of measures of originality or novelty and appropriateness of creative solution or effort have been suggested. For example, Reiter-Palmon and associates have suggested that originality could be assessed in terms of novelty, uniqueness, degree of extrapolation from the particular problem situation triggering the creative solution, and the degree to which the solution has broken free of the problem situation triggering it and has gone beyond the typical or rote response.<sup>2</sup> They have suggested that in judging appropriateness we may like to keep in mind the plausibility of the solution, its appropriateness to the problem, logic, and level of internal coherence in the solution. They have also talked of the degree to which the solution provided is expected from or consistent with the personality type of the problem-solver, that is, with the values, goals, etc. of the problem-solver.

Irving Taylor has suggested the following seven criteria for evaluating a creative effort.<sup>3</sup>

- 1. *Generativity*: Is it stimulating? Does it engender further creative ideas?
- 2. *Reformulation*: How much of a change has the creative effort produced over previous options or status quo?
- 3. Originality: How rare is the outcome of the effort?
- 4. *Relevance*: Does the creative effort solve a problem or fulfil a need?
- 5. *Hedonics*: How popular is the effort? How much of an impact it has made?
- 6. *Complexity*: How intricate is the information or knowledge utilized in the effort?
- 7. *Condensation*: How well does it simplify something that earlier was or seemed complicated? How well does it integrate the ideas utilized in the effort?

These criteria have been incorporated into an instrument called the Creative Product Inventory for assessing the creativity of any effort.

Besemer and Treffinger have come up with an even more elaborate creativity assessment formulation.<sup>4</sup> Their Creative Product Analysis Matric incorporates 125 evaluation criteria. For instance, their novelty criteria include originality, surprise value of the effort, and whether it is germinal or not, and their 'resolution' criteria include how valuable the effort is, whether it is logical or not, and how useful it is. Their elaboration and synthesis criteria include how organic, elegant, complex, understandable, and well-crafted the effort is. Obviously, all of these 125 criteria may not be relevant to all forms of creativity. For instance, their elaboration and synthesis criteria may be far more relevant to elaborative and expressive creativity than essence, existential, or empowering creativity. When multiple criteria are used for evaluating creative efforts, a problem arises. The effort may score high on some and low on some others. How do we then assess the quality of the creative effort? Do we simply aggregate the scores on the diverse criteria and declare as winner the effort with the highest score? But this presupposes that all the evaluation criteria have equal weight, a presupposition that may be indefensible in many situations.

My view is that we need first to determine what sort of creativity is manifested in the creative effort. Is it of the essence type, or elaboration type? Is it expressive, entrepreneurial, empowering, or existential? Is it a combination of any of these? After that it makes sense to evaluate the creative effort in terms of the criteria relevant to the form(s) of creativity manifested in the creative effort. As a preliminary step, I suggest the following criteria of evaluation for each form of creativity.

#### **Essence Creativity**

How novel is the formulation of the idea, view, formula, etc.? How plausible is it? How compact is it? How elegantly or pithily expressed is it? How large is the potential impact of the formulation on the relevant field or fields? If the formulation has been made with a practical end in mind, how large and favourable is its 'cash value'? How novel were the means, and how much divergent thinking was involved, in attaining the formulation?

#### **Elaborative Creativity**

How unique or imaginative is the creation? How complex is it? How well are the various components integrated, in terms of both novelty and appropriateness? To what extent novelty and appropriateness are fused together throughout the creation? To what extent is the creation contextualized, that is, made relevant to the context of the creative effort? How significant is the potential impact of the creation in its field or fields? If the elaboration has been made with a practical purpose in mind, how significantly favourable are its practical consequences? How ingenious are the means and the search processes involved in the elaboration?

#### **Expressive Creativity**

How astonishing is the expression? How evocative, impact-making, or aesthetic? How appropriate is it to the context? If the expression is for a practical purpose (such as an ad or a slogan), how far is the practical purpose attained? How much brainstorming and critical evaluation were involved in producing the expression?

#### **Existential Creativity**

How unique has the person become? What is the level of creativity and self-actualization attained? How intense has been the person's search for self-fulfilment? How positively has this self-fulfilment affected others having a relationship with the person?

#### **Entrepreneurial Creativity**

How novel is the venture? Given its initial risks how ingeniously were the risks, and negatives neutralized or turned into positives by the venture? How effectively managed has been the venture? How large is the impact of the venture on the relevant field(s)? How successful is the venture in terms of its objectives? To what extent has the venture spawned other fresh ventures?

#### **Empowerment Creativity**

How novel were the means by which empowerment was attempted? How novel were the goals of empowerment? How novel and appropriate were the forms of empowerment? How effective in a cost-benefit sense was the empowerment effort in terms of what was achieved? How significant was the impact of empowerment, that is, what was the impact beyond the target person or group that was empowered?

## **CREDIBLE EVALUATION**

Over the years, a wide range of instruments have been developed for measuring creativity reliably. By the mid-1980s, over 60 instruments had been identified.<sup>5</sup> These instruments fall broadly into 10 classes

- 1. Tests of convergent and divergent thinking abilities
- 2. Tests of creativity-related attitudes, motives, and interests
- 3. Tests of creativity-related personality
- 4. Biographical inventories that seek to assess creative achievement
- 5. Tests involving ratings of the creativity of individuals by their teachers, peers, and bosses
- 6. Tests involving judgements of how creative a 'product' is
- 7. Measures of how eminent a person is/was

- 8. Self reported measures of one's creative achievements and activities
- 9. Measures of how creativity-supportive one's environment is
- 10. Measures of creative problem-solving-related processes.

Evaluation of any creative effort is bound to be judgemental. But this does not mean that it is bound to be biased or naïve. There are ways of increasing the credibility of the judged creativity of an effort. It has been suggested by Teresa Amabile and others that if experts are involved in the evaluation process, and if the evaluation is along reasonably well-specified criteria, the resulting evaluation can be credible.<sup>6</sup> Obviously the experts need to be fair, objective, knowledgeable, and receptive to novelty. To minimize any personal biases, it may help if the assessment is done 'blind', that is, the experts are not told whose work they are evaluating. There should also be the opportunity to provide to the creator the anonymous assessments of the experts, so that the creator can, if he or she so chooses, modify the creation appropriately without wasting energy in attaching perverse motives to the critics.

## **IMPACT OF CREATION**

Besides novelty and appropriateness, some creativity experts have given a good deal of importance to the impact of the creation.<sup>7</sup> But how do we measure the impact of a creation? There are no very satisfactory answers to this question. Some, such as Dean Keith Simonton, have sought to measure it on the basis of general social consensus in the course of time about the originality of the work.<sup>8</sup> Another approach is to assess its impact on the basis of how it alters the relevant field. Robert Sternberg, James Kaufman, and Jean Pretz have come up with the 'propulsion' model of creativity, which incorporates a classificatory system for judging in what way and to what extent a creative work impacts a field, that is, brings about changes in it.<sup>9</sup> For this purpose, they have considered the change agenda or intent of the creator and the acceptability of the attempted change by the players in the field. They list eight types of attempted impact of creative contributions.

#### 1. Replication

There is no intent at all to change the field, but there may be an intent to strengthen the existing consensus in the field. For example, a creative study in the US may be replicated in India to see whether the conclusions of the US study hold in India. Replication can, of course, also be for a purely commercial gain, such as producing a copy of a masterpiece.

#### 2. Redefinition

The creator attempts to change the current perception in a field to a different

perception, such as a post-modernist attempt to view comic strips or graffiti as serious literature.

#### 3. Forward incrementation

Here, the creator's intent is to strengthen the existing direction of change in a field within limits that people in the field find acceptable. In primate research, for instance, if currently it is possible to teach chimps 500 words of a sign language, somebody able to teach 600 words of that language to chimps would be an example of forward incrementation. Such contributions are usually 'more of the same' types of relatively minor elaborations of the existing mode, or of the existing state of knowledge. The bulk of human creativity may be of this type. What is called *kaizen* innovations – small, incremental innovations – are generally of this type.<sup>10</sup> When many such innovations, however, take place, the effect may well be quite revolutionary.<sup>11</sup>

#### 4. Advance forward incrementation

When the creator attempts to make a change beyond the levels of tolerance in a field, the creation would be of this type. Many innovative ideas that are ahead of their times may fall into this category. The idea that painters should paint their psychological impressions of things (Impressionism) rather than attempt to reproduce faithfully what they see is an example of advance forward incrementation. The break with the status quo is not complete, but it is large and can generate opposition. For instance, there was violent denunciation of Impressionism when it first appeared in European painting.<sup>12</sup> Ricardo Semler, a Brazilian industrialist, institutionalized in his company not just participative management, but democratic management, for instance, by putting major strategic decisions like diversification or a business acquisition to a company-wide vote. This was also an example of advance forward incrementation.<sup>13</sup> Fortunately, however, it did not elicit any violent opposition from the owners, since the major shareholder was Semler himself. A third example of advance forward incrementation was Professor J. B. Rhine's research on ESP, for which he was violently abused, since at the time of Rhine's research most scientists thought of ESP as quackery.14

#### 5. Redirection

Here, the creator seeks a new or different direction, as Karl Marx attempted to do vis-à-vis the forces that create social change. For this purpose, he introduced into the social sciences the notion of dialectical change, a philosophical concept used by Hegel. Dialectical change is a radical change induced by the inherent contradictions of the prevailing social order. It was in contrast to the evolutionary doctrines of his time.

#### 6. **Reconstruction/reduction**

At times, the creator attempts to correct a fundamental error that has led a field astray. For instance, until Galileo's time people thought that the sun, the planets, and the stars revolved around the earth. But Galileo tried to show that the planets as well as the earth revolve around the sun. Charles Darwin corrected another huge error–the Aristotelian and Christian view of all living forms being created at the beginning of creation, and continuing for all time without any change of form. He and Wallace replaced the austere, eternal majesty of God's burst of creativity revealed in the *Genesis* section of the *Bible* by the vicious but continuously creative majesty of natural selection.

#### 7. Reinitiation

Reinitiation is similar to reconstruction except that the creator not only corrects a major error but works hard at taking the field forward in a new direction. Einstein not only demolished terrestrial physics but also developed a major new view of the universe through his relativity theory. Gautam Buddha not only demolished ritualistic and ascetic ways of spiritual progress, but developed his Middle Path of right conduct, etc. for achieving *nirvana* or liberation from the chains that fetter humans to births, deaths, and pain.

#### 8. Integration

Integration does not involve demolition, but instead a new synthesis of opposite points of view that can facilitate a major forward movement. At one point of time, there were two opposed views of the nature of light. Some thought it was a wave; others thought that it consisted of tiny particles. It was Max Planck who proposed that light is both a wave under certain circumstances and an emission of particles under other circumstances. 'Fusion' music is an interesting attempt at integrating Western and Indian music into a new idiom. 'Magic realism", used by Gabriel Garcia Marquez in his novels, is another example of an exciting blend of realism and fantasy.

These eight types do not necessarily represent ascending levels of impact. Type 1 (replication) to Type 8 (integration) may not always represent vastly different levels of impact. Each type of creative work could have a major impact under specific circumstances. For instance, when a low credibility experiment with astounding claims (such as cold fusion) is replicated by a Nobel laureate, the impact can be vast. Still, Sternberg, Kaufman, and Pretz make an important point: "The propulsion model suggests that the kinds of reactions generated by a given creative contribution are likely to vary with the type of creativity that is envinced in a given creative contribution."<sup>15</sup> They make another important point: "…we cannot fully judge that person's creativity independent of the context in which the person works."<sup>16</sup>

Another factor that seems to affect impact is the quantity of high-quality creative work. There may occasionally be a creator who dazzles the world with a single piece of creative brilliance. Usually, however, a lot of quality creative work translates into eminence. Gregory Feist did a study of 99 eminent American physicists, chemists, and biologists.<sup>17</sup> He found that for his sample, quantity of output and impact of the research done by the scientists were correlated and predicted eminence. Quantity of output was measured in terms of the number of the scientist's publications. Research impact was measured through a count of how often the work of the scientist was cited by other scientists in their work. Eminence was measured in terms of membership of a highly prestigious body (for instance, National Academy of Science), coveted honours/awards, the professional visibility of the scientist, and the scientist's judged creativity/historical significance.

Why should this be the case? Presumably because outstanding scientists like to publish their work in the most prestigious journals in which quality standards are high. Since these journals tend to be read more by the scientific community than mediocre journals, numerous publications in quality journals would earn respect from the scientific community, and their authors would be cited frequently and invited to major events.

Would this be true of other fields as well? Probably less so in those fields where quality screens are weak or even inappropriate. Writers of pulp fiction may be prolific, but seldom wear the laurels of eminence. Where, however, quality criteria are tough, as in the grant of such major awards as the Nobel Prize for literature or national literary awards, relatively large amount of high-quality work may well carry the day.

#### IMPROVING THE QUALITY OF OUR CREATIVITY

If we wish to improve the quality of our creativity (whatever our preferred creativity may be), subjecting it to evaluation by experts and by ourselves is a powerful way of improving it. The criteria have been spelt out. Try them out on your creations. They will provide useful prompts both to increasing their originality and also their appropriateness. Besides this sort of expert evaluation and self-evaluation, let me suggest some specifics.

- Get feedback on your creation from some non-experts. The naïve can often see problems that experts may not, and ask questions that can make you review some aspects of your creation, and make suggestions that can improve it.
- Take some time off from your creation. Creation is exhilarating but it is also fatiguing. You will come back to your creation refreshed and very likely spot flaws or improvements that you overlooked earlier.
- Try many small improvements to your creation. Each improvement makes one reappraise the creation for internal consistency, and thus may provoke many small

changes and adjustments. The more of these improvements and adjustments are made, the more distinctive and effective your creation may become.

- Think of the 'customers' or beneficiaries of your creation. What would they find interesting and useful about your creation and what would they consider objectionable? By taking the perspective of your creation's 'customers', you may be able to think of ways of increasing the impact of your creation.
- Think of effective ways of making others aware of your creation. It would be a shame if you create something and nobody becomes aware of it. Appropriate publicity may earn you the additional bonus of attracting to you others working on similar matters, and interacting with them may stimulate you into further creation.

# CONCLUDING COMMENTS

Improving the quality and impact of our creation is itself a creative activity, with rich learnings for our future creativity. Creativity is not just inspiration. It is also hard work at qualitative improvement, greater relevance, better acceptance, and so forth. Each change not only may improve the quality, but also make the creation more distinctive.

In the next chapter, we take up in earnest the foundations of lifelong creativity, the quest of this book.





1. Would the criteria you would like to utilize in evaluating a novel be the same as those for evaluating a new hypothesis for explaining longevity?

2. How would you compare the quality of creativity of a venture to give people a trip to the moon and back through a conventional rocket, versus a venture that markets custom-tailored psychedelic trips through the use of a new drug that is safe and non-addictive?

3. Some people think that many major awards like the Nobel Prize are biased and politically motivated. What system for assessing the merit of various works and contributions would you like to suggest?

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#### MENTAL GYM

1. Find something you consider is creative, and done by someone else. Now list at least 10 steps to improve its quality and impact. Try taking as many of these steps as possible.

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2. Do something creative—a poem perhaps, a creative good deed, a creative growth experience, a creative venture, or whatever. Now develop various steps to improve its quality and increase its impact. Now actually try taking the steps.

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# Part2

# The Quest for Lifelong Creativity

- Lifelong Creativity
- Mastering Creative Problem Solving
- Enhancing Creative Intelligence
- Acquiring a Creative Persona
- Weakening Our Inner Sensors
- Designing a Creativogenic Environment
- Techniques of Creative Problem Solving

# 9

# Lifelong Creativity

Once in a blue moon, practically everyone demonstrates some ingenuity, or does something that can be called creative because of its novelty and appropriateness in a context. Can we be permanently creative? That is, can we do creative things practically throughout our adult lives? Can we make an impact through such lifelong creativity? I believe both are possible. But for most of us this requires some remodelling of ourselves, our capabilities, and our environment. Let us take a look at some lifelong creators, especially at two psychologists. They represent two types–(1) the **focuser** who finds a niche and confines his/her creative work to that niche and (2) the **diversifier**, who finds a niche, gets established in it through innovative work, and then diversifies into other niches, sometimes altogether abandoning the original niche. Both of our psychologists

had penetrating, creative minds, though neither was born a prodigy. Both worked hard throughout their lives, developed their capabilities, displayed persistent creativity, attained great eminence, and profoundly shaped modern life. One preferred to contribute predominantly to a single domain of work; the other was versatile and contributed to several domains.

Be equal to your talent, not your age Yevgeny Yevtushenko

## FREUD AND JUNG

#### Freud

The psychologist Sigmund Freud was born in 1856 in Czechoslovakia of Jewish parents.<sup>1</sup> His father was a merchant. Freud went to the University of Vienna's medical school, later married, and settled down to a private practice. He studied for a year with Jean Charcot, a French psychiatrist, who employed hypnotism for treating nervous disorders like hysteria. Freud tried out hypnotism but did not find it efficacious. He picked up the free association method used by a Viennese colleague to get at the roots of symptoms of various neuroses and mental disorders. In the course of his practice, Freud developed the notion that sexual conflicts, especially childhood sexual conflicts, are at the root of most nervous disorders such as hysteria and paranoia. For curing patients with such disorders Freud developed the technique of psychoanalysis. He gave the world a rich, new vocabulary of the tricks the mind plays for retaining its sanity in the face of deeply-seated, guilt- and anger-ridden, long repressed sexual conflicts. These include displacement, or the development of, say, hostile feelings not towards the real object or powerful person that has provoked such a feeling, but towards a safer substitute. Some others are repression of anxiety creating feelings and thoughts from one's consciousness into the unconscious; projection, or attributing to others one's unacceptable feelings; and reaction formation, or replacement in the consciousness of an unacceptable feeling by its acceptable opposite feeling.

Almost all of Freud's work related to understanding the pressures within the unconscious, how they affect consciousness, and how through psychoanalysis one can get to deeply repressed negative feelings that are the cause of the mischief. He developed a theory of consciousness that has hugely influenced psychology, anthropology, literature, and the humanities. Freud himself continued for over 50 years to focus on his chosen, previously under-known domain, exploring its many dimensions.

#### Jung

Carl Gustav Jung typifies a professional who starts out in a fairly narrow, specialized field but then branches out into a number of related and even some seemingly unrelated fields.<sup>2</sup> Jung was born in 1875 in Switzerland into a family of Christian reform pastors (his father as well as eight of his uncles were pastors). He therefore had a fairly thorough grounding in liberal thinking. His mother suffered from a nervous disorder, his father was irritable, and his sister was 9 years younger. So Jung was pretty much left to his own devices. His teenage confusions and religious conflicts eventually gave way to intellectual interests. Some occult experiences as a student in Basel University led him to psychiatry as a career. After getting his degree, he worked in a mental hospital in Zurich where he came in contact with an eminent psychiatrist named Eugen Bleuler. Later, he encountered the work of Sigmund Freud and became his disciple. After six years, however, Jung broke with Freud. He lectured as well as worked in a clinic, practiced privately, and set up a lab for studying mental patients using a word association test. During these years, he became fascinated with the nature and functioning of the human psyche. He developed the notion of the collective unconscious–every human's inheritance of man's evolutionary development and deeply buried memories of repeated, potent experiences over the eons. The principal components of the collective unconscious are archetypes. Our deepest, most universal creative efforts may be the playing out of these archetypes. He also developed the notion of individuation. As we grow older, we get increasingly differentiated in terms of our attitudes, beliefs, personality traits, knowledge, etc. Jung believed that humans have a need for internal coherence and completeness. Achieving it, even as we grow more and more differentiated, is individuation. It is this individuation that can make us unique, healthy individuals, and is a foundation of our existential creativity.

Over the years, his scholarly interests took him beyond psychiatry into the related fields of psychology and psychotherapy, and well beyond these into mythology, religion, art, literature, social problems, astrology, ESP, yoga, alchemy, spiritualism, and even flying saucers! Besides these intellectual interests, he was an expert sailor and mountaineer, and he also enjoyed gardening, splitting wood, chiselling stone, building structures, and indulging in games and other physical activities. He began his autobiography with the statement, "My life is a story of the self-realization of the unconscious." His life opened up like the petals of a lotus into many truths and beauties.

The Jung-type versatile lifelong creator is much rarer. The type seems to flower most during periods of renascence or major social change when an old, conservative, repressive society gives way to a collective awakening to a life of freedom and the questioning of institutionalized rigidities. A large number of new fields of activity come into existence and most old fields are rejuvenated. A renascence is a heady time of optimism, discovery, and invention in every nook and corner of society, and some creatively gifted individuals respond to the avalanche of challenges and opportunities by making creative contributions not just to one field but many fields. Leonardo da Vinci, the 15<sup>th</sup> century painter of *Mona Lisa*, epitomizes the renascence versatile genius. He was not only a great painter but also inventor, sculptor, military engineer, anatomist, architect, town planner, designer, and lute player. Closer to our times, the Indian poet Rabindranath Tagore was a celebrated versatile genius of the Indian renascence who was a poet, novelist, short story writer, lyricist and composer, playwright, painter, educationist, and founder of institutions. But there have been a host of others, too.

K.M. Munshi, born in Bharuch (western India), was not only an outstanding novelist but also a dramatist; writer of short stories, biographies, and autobiographies; historian; an eminent, highly resourceful lawyer; a politician and an administrator; a participant in India's struggle for

independence; one of the draftsmen of the Indian Constitution, and a founder of many institutions including the Bharatiya Vidya Bhavan, itself a federation of numerous institutions concerned with various facets of Indian culture. Herbert Simon, an American academic, started out as a political scientist and made pioneering contributions to administrative behaviour; turned into an organization theorist and co-authored a profoundly influential book on the subject; became one of the pioneers in cognitive psychology, artificial intelligence, and computer simulation of human problem solving; made important contributions to philosophy, management science, and economics (for which he got the Nobel prize in Economics), and wrote a fascinating autobiography. André Malraux, a Frenchman, began his adult life as a classicist, having studied Sanskrit and Chinese. He was a poet and an award-winning novelist, worked as an archaeologist in the then French Indo-China, became a communist and joined freedom struggles in Annam and China, participated in anti-Fascist struggles in Europe, joined the French resistance during World War II, turned a Gaulist and became a minister, and made a major contribution to our understanding of the place of art in life through the book *The Voices of Silence*.

#### **LIFELONG CREATORS**

Lifelong creativity seems to require a good fit between one's innermost yearnings and one's domain of creativity. And this frequently means trial-and-error search for such a domain. This domain of creativity may or may not coincide with one's vocation. Forced by circumstances, one may take up a job that earns one a livelihood. But the work may not resonate with one's deeper yearnings. In societies with limited opportunities for gainful employment, the life of livelihood may remain tedious and frustrating, compensated, however, by creativity in the more fulfilling realms of art, literature, science, social work, and so on. There are, of course, some people who get their creative juice out of their work for livelihood. But even they may switch jobs or careers until they find something that turns into a creative calling. There are many examples.

Freud and Jung both qualified in one discipline (medicine and psychiatry, respectively) and moved permanently into the psychology of the unconscious. A number of other eminent psychologists have done the same.<sup>3</sup> Alfred Adler, the father of ego psychology, initially specialized in opthalmology (treatment of eyes) before moving into general medicine and finally into psychiatry and psychoanalysis. Erik H. Erikson, who developed an influential model of human growth and development during the human life cycle, started out as an artist and an art teacher, and only after several years became a psychologist. Abraham Maslow, trained as a researcher on the behaviour of apes, did considerable research in this field, and then dumped it to become a humanist psychologist and develop the highly influential notions of the hierarchy of needs and the self-actualizing person. Jean Piaget, the famous child and educational psychologist, was initially an animal biologist, specializing in the study of marine creatures called molluscs. B.F.
Skinner, famous for his learning theories and the concept of operant conditioning, started out as a writer.

This switching behaviour is not, of course, unique to psychologists. Karl Marx began his professional career as a journalist before switching to philosophy and revolutionary activity. Herman Melville, the author of *Moby Dick*, one of the greatest novels of America, spent many years as a sailor and a navy man before becoming a full-time writer. Mark Twain traversed through the jobs of a printer, a boat pilot, and a soldier before becoming a writer and a humorist. Mahatma Gandhi practised for a while as a lawyer before turning to politics and led India to freedom through innovative means. And lest it be thought that only superhumans perform this switching act, I know of qualified accountants dumping their profession in favour of dance, painting, or poetry; a mathematician, who became an archaeologist; professional managers, who gave up lucrative corporate careers to start mission-charged organizations; and economists who, after a while, found investigative journalism more appetizing.

There must, of course, be many who remain active as creators in their original area of specialization. But the fact that so many creators dumped their area of specialization and migrated to another area they found more engrossing raises interesting questions. Are such people unstable? Are they chronic shifters? The evidence suggests not. After all, they contributed creatively to their new field for decades. How come they did not find their 'lifelong love' initially? There may be many reasons for this. Young people are frequently pushed into high-status occupations by parents, teachers, and other such authority figures. Often people go into fields without much knowledge of what they are getting into. It is only after several years of grappling with a field that the conviction may grow—that this is not interesting enough. Chance encounters with fascinating persons and books can pull the person out of the rut and launch him or her into a much more exciting new career.

The initial occupation may not be a waste at all. Some very important skills and experiences may be picked up that can be creatively utilized in a new field. Years spent as a journalist, sailor, doctor, or lawyer provide intimate glimpses into humanity–insights that can be useful in making creative contributions into such fields as psychology, politics, or literature. Skills learnt in exacting fields like medicine, zoology, biology, physics, mathematics, or chemistry can provide the sense of rigour and the tightness of logic that can be very useful in refining creative insights in the field chosen later. And, of course, concepts can migrate from the initial field to the later field of interest and help to view phenomena in this later field from new angles.

Lifelong creators are especially interesting. If they live long enough, they tend to produce a lot, and as some researchers of creativity have shown, those who produce much creative work also tend to make a significant contribution to their respective fields.<sup>4</sup> Such lifetime creators cover a wide spectrum–artists, writers, scientists, entrepreneurs, social scientists, social reformers, and professionals (see box on *Lifelong Creative Architects*). These creators show the potential

contribution to human civilisation that many can make, not just a gifted few. They are good role models for all of us. They demonstrate that lifelong creativity is within the reach of all of us.

## **TRAITS OF LIFELONG CREATORS**

What powers lifelong creators? Most share some personality traits, such as curiosity, independence, persistence, resourcefulness, and learning ability, and retain these well into old

## **Lifelong Creative Architects**

The Institute of Personality Assessment and Research (IPAR) at the University of California at Berkeley, US, has been trying to piece together the profiles of several American creative professionals like architects, mathematicians, artists, writers, and so forth through a variety of research methods ranging from real-life problem situations and problem-solving experiments, projective tests designed to reveal hidden aspects of personality, tests and questionnaires to get at attitudes, interests, and values, to reconstruction of life histories.<sup>5</sup> Since the architect draws on the arts, humanities, and social sciences for ideas on aesthetic habitats, and on hard sciences and technologies for durability, functionality, and cost-effectiveness, the IPAR's study of creative architects seems to represent well how lifelong creative professionals differ from ordinary professionals.<sup>6</sup>

The sample consisted of 40 highly creative architects (nominated by their peers and architecture faculty members for their exceptional creativity), 43 other architects with similar age and location profiles, who had worked with the creative architects, and a sample of 41 architects with similar age and location profiles, who had not worked with the creative architects. All these architects were initially studied during 1958–1960.

The personality factors that clearly differentiated the 40 creative architects from the 84 ordinary architects were the following.

• Intelligence was not a distinguishing factor; it averaged a score of about 130 for both the creative and ordinary architects. But measured creativity certainly was—the

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creative architects scored 5.5 on a scale of versus 3.9 for the non-creative architects.

- Among aesthetic, theoretical, economic, and other values, the strongest commitments of the creative architects were to aesthetic and theoretical values. The weakest commitment was to economic (money-related) values. This was not the order of priority of the non-creative architects.
- The creative architects were substantially more flexible than the non-creative architects. They were also more accepting of their selves, higher on 'social participation', and interestingly, on 'feminity'. 'Feminity' is an indicator of openness and acceptance of feelings and emotions, a sensitive intellect, and far-ranging interests including some that are socially stereotyped as feminine, such as cooking and interior design.
- The creative architects were far less bothered about 'good impression', keeping 'self-control', and 'achievement through conformance'. But they seemed to be a more troubled lot, scoring significantly lower on 'sense of well-being'. They also were lower on 'communality', that is, they were readier to admit to personal views that are unconventional.
- In their cognitive or mental response styles, the creative architects seemed to rely relatively more on their intuitions than on what their senses told them. Also, they tended to prefer perception to judging, that is, they were more open to their inner as well as external experiences, and less prone to jump to judgements of good or bad, right or wrong.
- The creative architects tended to be relatively more excited by whatever was complex, arresting, or asymmetrical.

Stephanie Dudek and Wallace Hall studied 70 of these architects again in 1983–84, that is, about 25 years later when their average age was 71.<sup>7</sup> They found that the personality characteristics had remained remarkably stable even after 25 years. Besides, even in old age, the creative, by now very eminent architects still retained their creative entrepreneurship and dominance of their niches. To them, their work was almost everything; to the less eminent architects, family life had higher priority.

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The picture that emerges of the lifelong creative architect, like that of many other creative professionals, is of a bright, creative, intuitive, perceptive, and sensitive person with versatile interests and a strongly developed sense of beauty, who is interested in ideas, models, and causes of phenomena; has a somewhat troubled, anguished, restless soul; is an active participant in human affairs and is quite willing to speak his/her mind and bare his/her heart. The creative architect is a fascinating fusion of the germinal male and the receptive, creative female, like Ardhanarishwara (the half-female, half-male Hindu god Shiva).

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age. Many have quite complex personalities, in which such opposites are combined as craziness and sanity, imagination and reality contact, and moodiness and rationality. They tend to find creative work inherently and overwhelmingly interesting, although many are not above seeking some mundane returns out of it. Some have a yen to blaze new trails, be the first to discover, invent, or create. Most are good at alternating between convergent and divergent thinking, so that they keep on coming up with solutions to problems that are both novel and feasible. They are also strong in several dimensions of intelligence-intuition, fluency of ideas, flexibility or ability to see problems from many angles, sensitivity to issues and problems that others frequently fail to see, and ability to structure problems in refreshing ways, as well as IQ, ability to evaluate options carefully, ability to optimize, etc. Increasingly in modern times, they also amass the necessary level of technical knowledge in their fields to be able to step beyond it through innovation. Many choose occupations in which creativity has much scope because the field is relatively new (such as ESP), or is a hybrid of two or more fields and therefore open to cross-fertilization of ideas (such as management), or is inherently creative because the end product cannot be standardized and/or the means by which the end product is secured cannot be standardized (such as creativity itself, spirituality, art, and literature).

Besides these inherent strengths of lifelong creators, there are techniques that can augment the capacity for creative problem solving. A large number have been developed. The better known are brainstorming, questions checklist, morphological analysis, attributes changing, synectics, and their combinations. They are discussed more fully in Chapter 15.

## MODEL OF LIFELONG CREATIVITY

Figure 9.1 Diagram 1 puts together a model of lifelong creativity. The model essentially says that when a stabilized creative personality is conjoined with a developed creative intelligence, a yen for creativity, the choice of a creativity charged occupation or domain, the habitual use of a creative problem solving process, and sufficient expertise, lifelong creativity becomes probable. Creativity technology is the icing on the cake that can enable even the less gifted to be enduringly creative. The quality of creativity may, of course, vary even for a great lifetime creator, depending upon how well the various forces shown in the diagram are orchestrated, as well as upon situational factors. But creativity is accretive. The more one engages in creative work, the more skills one picks up, the more successful one gets, and the more opportunities present themselves for creative striving. Except for a few fields, creativity seems to increase with age, declining only past the age of 60, when physical and mental abilities undergo decline.<sup>8</sup>

The model in Figure 9.1 is a multiplicative one. That means that the magnitude of lifetime

Fig. 9.1 Model of Lifelong Creativity



creativity rises rapidly when **each** of the elements influencing creativity, creative personality, zest for creativity, creative intelligence, etc. is at least moderately high. If any element is very weak, the magnitude will decline steeply. To illustrate, if we raise from our current level each of the elements by 20%, a very attainable goal, the potential for lifelong creativity would rise by  $\{(1.2 \times 1.2 \times 1.2 \times 1.2) | \text{less 1}\}$  or just about 150%. If one learns to use creativity techniques, the rise is likely to shoot up even more. One does not need to be born a genius to display lifelong creativity;

one only needs to raise modestly each of the five elements of creative personality, motivation, intelligence, process, and environment to become a lifelong creator. The model also explains why so many bright people end up doing nothing significant in life-they might lack motivation, or choose the wrong occupation, or may not follow a creative problem solving process, or fall short in divergent thinking ability. The model also explains why so few contribute so much, and why so many comparably bright, contribute so little (see box on '*Laws' of Creative Achievement*).

### 'Laws' of Creative Achievement

In many fields, distinctive contributions tend to be made by a tiny minority. Dean Keith Simonton, who has studied creative achievement in different fields, states, "In any given domain of creative activity it is typical to find that around 10% of the creators are responsible for 50% of all the contributions."<sup>9</sup> This implies that the high creators' average creative contributions may average many times-perhaps 10 times-those of the low creators. Some scholars have developed 'laws' to account for this huge asymmetry. One of these – the so-called Price 'law' – states that if N represents the number of creators active in a given field, then about half of the contributions in that field would be made by  $\sqrt{N^{10}}$  Thus, if there are 100 film producers that have produced 1000 feature films in India in a given period, say 1991–2000 AD, about 500 would have been produced by the 10 top producers, that is an average of 50 films per top producer, while the remaining 500 would have been produced by the remaining 90 producers, that is an average of 5.6 films per producer. The 'law' holds true for outstanding contributions, too. Simonton found that the most widely utilized Western musical compositions were authored by some 250 composers. Just 16 (approximate square root of 250), in fact, accounted for half of the composers.<sup>11</sup> Mozart, Bach, and Beethoven each contributed about 6% of these most popular compositions, a percentage contributed in the aggregate by the 150 least productive composers.

Thus, Price's 'law' seems to prevail for both quantity and quality of creative output. Similar to this is Lotka's 'law', which states that the number of persons who contribute a specific number of outputs is inversely proportional to the number of outputs squared.<sup>12</sup> More precisely,  $N = C/NP^2$ , where C is a constant, NP = number of outputs, and N is the number of persons that have produced NP outputs.

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Why is there this disproportionately large contribution in practically any field by a small minority of creators? Is it because this small minority is God's chosen people? The reasons are likely to be far more mundane. If we think of creative achievement as an outcome of several facilitators—some biological, some environmental, some personality-driven, some related to mental functioning, some related to training, education, and opportunities, and so forth-and if we consider that it is the synergy between them that enables high and sustained creative achievement, then obviously only a few in any group will have adequate levels of all of these facilitators. After all, how many in any field can be blessed with a favourable, opportunity-rich work environment **and** a curious, persistent, independent-type personality and creative intelligence and zest for creativity and innovation and good education and training in the field of creation? If even one of these forces is weak, the creative output may be very adversely affected. No wonder then that poor people, the oppressed communities, and those like women who are heavily socially constrained, have such a small share of creative contributions. Removing the constraints that diminish the creative potential of the disadvantaged is one of the great challenges of the human race, and its greatest opportunity for a highly creative civilization.

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## **CONCLUDING COMMENTS**

In the next several chapters, we step into deeper waters. Each of the elements that facilitates lifelong creativity is explored in some detail. Since the objective is to raise our potential for lifelong creativity, several self-diagnosis oriented instruments are provided, so that one can get an idea of where one stands and what needs to be done for increasing one's potential for enduring creativity. The next chapter profiles the creative problem solving process. It and later chapters will clarify how we need to change our personality, our intelligence, and our environment to ensure lifelong creativity.





I. Why are some people so much more versatile in their creative outputs than others?

- 2. Would a gifted writer, forced to take the job of a clerk in a large government bureaucracy, be a more prolific creator than a wealthy person who is also an equally gifted writer?
- 3. Would 19<sup>th</sup> century India and the US have proportionately more lifelong creators than contemporary India and the US?

## MENTAL GYM

1. Recall someone you know who was/is an enduringly creative person. What made/makes the person enduringly creative?

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2. Now take a good look at yourself. Come up with at least 10 specific steps you can take to increase your potential for lifelong creativity.

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The McGraw Hill Companies

# 10

# Mastering Creative Problem Solving



## WHAT IS A PROBLEM?

Broadly speaking, a problem exists for one when there is a puzzle, when a goal is not achieved, and/or when one experiences unwanted symptoms. When a lad fails at a test, even when his performance is A level in other tests, there is a puzzle. Also his goal of passing the test is not realized. Further, anticipating criticism at home for failing the test, he experiences unwanted symptoms of anxiety, anger, and depression. The lad has a problem!

Problems are only opportunities in work clothes Henry J. Kaiser

A problem may or may not evoke strong feelings. If the test is crucial for the lad's career, deep feelings of disappointment, anger, anxiety, and frustration may be evoked, and these feelings may influence the way he goes about solving the problem.

Some problems are well-defined. If a test question is to prove that an equilateral triangle (one with equal sides) is also an equiangular triangle (one with equal angles), the problem is clearly known to anyone who has studied Euclidean geometry. Not only is the 'what' of the problem clearly specified, the proof, too, is well-known, and all the person has to do is to recall the proof. So, the 'how' of solving the problem is also well-known. And whether or not the problem is solved is also easily known. If the proof provided by the problem-solver logically leads to the inference that equilateral triangles are equiangular, then the problem-solver knows that the problem is solved.

But many real-life problems are not well defined. Frequently, there is some information but it is not clear whether there is a problem, and if so what it is. Suppose you find a child standing in a street at night. Is there a problem? We do not now. The child may be lost, or may be trying to run away from home, in which case there is a problem; but if he/she is only standing outside his home for a breath of fresh air, there is no problem. Sometimes the problem is clearly specified, but there is no clue how one can go about solving it. An impoverished young man falls in love with an affluent, pretty girl. The problem for the young man is clear—but he may be clueless as to how to go about the matter. And sometimes, the problem may be well specified, the process of solving it may be well known, and yet it may be quite unclear as to whether the problem has been solved or not. Suppose a wife wants to please her husband on his birthday with a gift. The wife knows how to buy a gift. But was the husband really pleased with the gift or merely pretended to be pleased to please his wife?

By and large, problems that are well-defined do not require much divergent thinking. A well-defined problem is one in which the problem is clearly stated, the process by which it can be solved is well-known, and there is no ambiguity as to what constitutes the correct solution. However, both convergent and divergent thinking capabilities are needed, often in abundant measure, for tackling ill-defined problems, that is, situations in which it is not clear what the problem is, and/or how to go about solving it, and/or what constitutes an acceptable solution. It always pays to try and identify what is ill-defined about a problem so as to achieve a more complete–and correct–statement of what the problem is. This is the process of structuring the ill-defined problem. Without clarity on what the problem is, divergent thinking can turn into irrelevant thinking.

## STRUCTURING OF ILL-DEFINED PROBLEMS

From a practical standpoint, the ability to define or structure ill-defined problems, and the ability to seek creative solutions through divergent thinking, are very important. Although structuring a problem mostly requires the exercise of convergent thinking skills (defining terms, identifying the constraints or requirements of the problem, establishing criteria for evaluating solutions, analysing the problem into its components, reasoning from facts or assumptions, etc.), this structuring is essential if divergent thinking later is to have focus and relevance. Research suggests that in art-related creative problem solving, the more time spent on problem structuring, the more aesthetic and original the outcome is likely to be.<sup>1</sup>

The basic step in structuring a real-life problem is to ask: "What is it that makes this a problem? Is there some unresolved oddity or anomaly? Are any goals not being met? Are there some unwanted effects?" Once some clarity is achieved on what the problem is, even difficult problems may become much more tractable. Once we are clear about what is disturbing our peace of mind, some rational analysis can usually uncover a solution. Often there is much more to problems than what appears on the surface. Some persistent probing into why a goal is not being achieved, or why unwanted symptoms have appeared, may uncover the more fundamental nature of the problem. If a child has fever, most may be satisfied with a diagnosis that an infection, say, the 'flu virus' has caused the fever. But if we should ask, "Why has he got influenza and not his siblings?", we may be able to uncover more fundamental causes of the fever, say, the child's debility creating food habits (such as insufficient intake of vitamins) or debility inducing anxiety (due perhaps to fear of doing badly in an examination). Thus, the problem may not be just discomfort due to an infection, but rather, an inappropriate dietary habit or a severe fear of failure that predisposes the child to influenza and other infections. The more in-depth the diagnosis of the problem, the greater the chance of finding a more permanent or satisfactory solution. Thus, ability to structure problems by probing beneath superficial symptoms or information often differentiates the better from the average problem-solver.

The next order of business is to get some understanding of the requirements or constraints under which problem solving is to proceed and the eventual solution is to be found. All or even major constraints are seldom given—usually they have to be searched out and clarified. Much informal asking around as well as systematic investigation is needed to establish the constraints. Not all constraints are equally binding, of course. Some may be constraints at the moment, but could be changed with some effort or after some time; others may be more basic and unalterable.

Thus, some idea of what is odd about the situation, what and why some goals are not being met, are there undesirable symptoms and why they have arisen, and the short-term and long-term constraints within which the solution has to be found constitute a first definition of the problem. As more information becomes available, this problem statement may undergo several

modifications. Basically, once a problem is understood, problem solving thereafter is a process of finding a solution or solutions currently unknown, or of reducing the gap between the current state of the problem and some known, ideal solution of the problem.<sup>2</sup>

It is useful to identify those areas of ignorance that prevent one from solving the problem. Is there some ambiguity about what the real problem is? How big or significant is the problem? Is there some uncertainty about what means or procedures need to be followed to solve the problem? Is there doubt about what kind of a solution is needed? These need to be identified.

To summarize, the following questions can help one get a good definition of the problem.

- 1. What is the problem? Is there anything puzzling or odd about the situation? Is some goal being blocked? Are there some undesirable symptoms that need to be eliminated?
- 2. Why has the oddity arisen? Why is the goal being blocked? Why do the undesirable symptoms exist?
- 3. Are there constraints or conditions in the problem situation that need to be borne in mind in solving the problem? Which of these are of a permanent nature? Are there hidden constraints that need to be made explicit?
- 4. What are the major areas of ignorance that impede one's problem solving effort? Are we clear about what and how big the problem is, what procedures have to be followed for solving it, and the character of the acceptable solution?

As an example of problem definition, let us consider the problem of corruption in many emerging economies. Apparently, corruption is rampant. There are allegations in the media of corruption at the highest political, administrative, and corporate levels. Nothing, apparently, seems to move without bribes. Few official controls seem to work because of corruption. Periodically, the government comes up with schemes, such as the issue of freely and anonymously transferable government bonds, to mop up black wealth generated by corruption. Clearly, there are many indications of corruption being a major problem. The goal of equitable economic development is not being met, and there are undesirable symptoms, such as honest citizens increasingly jettisoning honesty due to the prevailing ethos, elections being vitiated by black money, merit coming to be regarded as irrelevant by seekers of political office, and an untaxed parallel economy that deprives the government of sorely needed resources.

If we should probe into the 'whys' of corruption, we may be able to go beyond such ready and superficial answers as corruption is a global phenomenon, or people in poor countries are corrupt, or their bureaucrats, political leaders, and businessmen are bad. There may be more fundamental reasons for corruption. One may be the structure of the government, especially a democratic government: adult franchise, which means huge constituencies, which means large

electioneering expenses, which means dependence on businessmen to bankroll electioneering expenses, which means that businessmen can buy their way out of inconvenient controls, which means creation of inconvenient controls to induce people to pay up, which means the creation of a black market economy to generate black money to circumvent controls and keep politicians happy, and so on. This may be compounded by a form of government in which the tenure of ministers is uncertain due to the tenure being dependent on majority vote in the legislature, which in turn means a short-term perspective in the ministers, a tendency to make hay while the sun shines, and favours to legislators to maintain majority support. Another fundamental reason may be the choice of the strategy of economic growth: capitalism (of both the private and state varieties) with socialist trimmings, which means activation of human greed through financial incentives in a system of controls, and therefore, progressive erosion of other bases of growth such as ethical self-actualization of the Gandhian type or collectivist concern of the Marxist variety. Given these fundamental reasons, the system seems guaranteed to breed corrupt leadership and corrupt practices on an increasing scale.

In attempting to solve the problem of corruption, a number of constraints need to be borne in mind. Some of the short-term constraints may be electoral laws, industrial control legislation, and various administrative practices. The more durable constraints may be the pattern of distribution of wealth, the level of literacy, and the form of government. The most durable constraints may be cultural values and commitment to the form of government.

Identification of areas of ignorance is the last step in defining the problem of corruption. A number of questions come to mind. How big is the problem? What are the major mechanisms of corruption? In which sectors of administration and of the economy is there greatest concentration of corruption? What do we know about the demographic characteristics of those who are corrupt? What could be acceptable solutions? For example, any solution must retain the basic features of democracy, market economy, rule of law, and civil rights.

## **CREATIVE PROBLEM SOLVING**

Let us now proceed from problem structuring to creative problem solving. Let us begin with two well-known documented examples of creative problem solving to gain insights into it.

The mathematician Poincaré provides an illuminating description of the process by which he hit upon an original solution to a mathematical problem.<sup>3</sup> For a fortnight, he tried to prove that there could not be any functions like those he called Fuchsian functions. Every day he seated himself at a table, and tried a great number of combinations but reached no results. One evening, contrary to his custom, he drank black coffee and could not sleep. "Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next

morning I had established the existence of a class of Fuchsian functions...I had only to write out the results, which took but a few hours."

Then he wanted to represent these functions by the quotient of two series. This idea, however, was perfectly conscious. "The analogy with elliptic functions guided me...I succeeded without difficulty in forming the series I have called theta-Fuchsian."

About this time he left on a geological trip, and forgot his mathematical work. Having reached Coutances, he entered an omnibus. "At the moment when I put my foot on the step the idea came to me without anything in my former thoughts seeming to have paved the way for it, that the transformations I had used to define the Fuchsian functions were identical with those of non-Euclidean geometry...On my return...for conscience's sake I verified the result..."

Then he turned his attention to the study of some arithmetical questions, but without much success and without a suspicion of any connection with his preceding labours. Disgusted with failure, he went to spend a few days at the seaside, and thought of something else. One morning, walking by the sea, the idea came to him, "with just the same characteristics of brevity, suddenness and immediate certainty," that the arithmetic transformations were identical with those of non-Euclidean geometry. Thereupon, he deduced the consequences of this insight.

Notice the intense preoccupation with a problem, followed by a distraction, during which insight occurs, which in turn is followed by a conscious logical effort, again a distraction, another illumination that restructures the original problem, verification and working out of the implications of the illumination, and so forth. Notice also the structure of the task. It is difficult. There is a fair amount of clarity about the nature of the problem and to some extent the mathematical procedures that are appropriate. There is much less clarity about what the solution could be. The solution, whatever it may be, is unique since answer to the problem does not offer a variety to choose from, that is, there are not multiple answers to the problem. The process may best be described as several cycles of convergent thinking (preparation)– divergent thinking (illumination or insight that restructures the problem)–convergent thinking (verification and extension).

Let us now examine the creative process involved in a very different field, namely, the writing of poetry. Here is Stephen Spender, a British poet, describing the process.

"My own experience of inspiration is certainly that of a line or phrase or a word or sometimes something still vague, a dim cloud of an idea which I feel must be condensed into a shower of words. The peculiarity of the key word or line is that it...occurs in what seems to be an active, male, germinal form as though it were the centre of a statement requiring a beginning and an end, and as though it had an impulse in a certain direction."<sup>4</sup>

Spender was standing in the corridor of a train passing through the Black Country in England. He saw a landscape of "pits and pitheads, artificial mountains, jagged yellow wounds in the earth,

everything transformed as though by the tail of an enormous animal or giant tearing up the earth in search of prey or treasure." A stranger next to him echoed his inmost thought. He said: "Everything there is man-made." At this moment a line flashed into Spender's head:

"A language of flesh and roses."

A line like the above is not, of course, a poem. But it is the inspiration–like illumination described by Poincaré–that triggers the poetic effort. The latter creative effort is the working out of the poetic implications of the seminal metaphor–in much the same way that scientists or mathematicians work out the details and implications of the seminal insight.

Let us now scan several different models of how creative problem solving takes place.

## **MODELS OF CREATIVE PROBLEM-SOLVING**

#### **Stages Models**

Graham Wallas, an early student of creative problem solving, as well as several others, believed that cycles of four overlapping stages characterize most creative problem solving, namely, the stages of (1) preparation, (2) incubation, (3) illumination, and verification.<sup>5</sup> Preparation involves the intense investigation of the problem in all directions, including a full understanding of what the problem is, the constraints within which it has to be solved, detailed analysis using known procedures, etc. This is what we have called problem structuring. Incubation is the letting go of the problem by the conscious mind and allowing it to ferment below the level of consciousness. Illumination or insight is being struck by an unexpected, novel solution in a eureka-like experience. Verification is the evaluation or verification of this solution, its refinement, the working out of its implications, etc. While there is no rigid sequence, broadly speaking preparation precedes incubation, incubation precedes illumination, and illumination precedes werification. Poincaré's account about the Fuchsian functions noted earlier fits these four stages well.

Research on the four-stage process of creative problem solving throws interesting light on its various aspects. The preparation phase is the one in which the problem-solver familiarizes himself/herself with the problem. Einstein is said to have commented once that if he had one hour to solve a difficult problem he would spend 50 minutes studying it. In research on creative versus less creative scientists, it was found that the creative scientists tended to describe the early stages of thought on a problem as 'diffused' and 'scanning,' while the less creative scientists tended to describe these stages as 'focused' and 'sharp'<sup>6</sup> Perhaps an analogy may be useful here. If we wish to know more about an unknown planet, it makes more sense to circumnavigate the planet in a

spacecraft around the Equator and around the Poles to get a broad map of the planet's general topography first, before descending and making detailed investigations at the points of descent. Creative scientists tend to pursue the circumnavigation strategy; the less creative scientists, eager to show results, tend to skip circumnavigation and prematurely get down to detailed investigation of a spot. As a consequence, they may often miss the larger picture and really interesting facts or patterns.

Incubation is often necessary for insights to occur in solving difficult problems. As William Kirkwood has pointed out, incubation helps one abandon prevailing lines of thought and secure a fresh start, that is, it helps the mind to forget some self-imposed constraints on thinking. It also enables subconscious transformation of data because during the lull in conscious problem solving other data stored in memory as well as fresh data from outside get a chance of interacting with the problem data.<sup>7</sup> In an experimental setting, incubation can be simulated by a silent recess or work on a different task or a coffee break. In his experiments with four person groups, Kirkwood found that groups whose task was interrupted by another task tended to produce more ideas than groups whose task was not interrupted, and indeed, the more different the interposed task from the original task, the larger was the number of ideas produced. Thus, recharging batteries by temporarily engaging in a very different task may be useful for spurring bright ideas.

Creative inspiration is sometimes so fantastic an experience that it is the one single feature of creativity that has wreathed it with a divine aura. Many creators have described inspiration as a 'magic process', as 'supernatural and inexplicable'. Rosamond Harding, reviewing the illuminations of a large number of creative geniuses, pointed out, "The state of inspiration is often accompanied by two distinct and vivid impressions; the sense of possession and the sense of compulsion."<sup>8</sup> For instance, William Blake, the poet, claimed about a poem that it had been dictated to his mind almost against his will, and Charles Dickens claimed that when he sat down to write, some beneficent power showed it all to him. Tchaikovsky, the music composer, claimed that a supernatural force made him compose a piece of music. Not only does some force seem to seize the person at the moment of inspiration, it often compels the person to continue working until the creation is completed. Wordsworth, Thackeray, Dickens, George Meredith, and Schopenhauer–all claimed that once they were in the grip of an idea they felt chained to it until the work was over.

In several cases, there are physical and mental symptoms preceding or accompanying inspiration. Dickens felt terribly restless for several days preceding inspiration. At the moment of inspiration blood rushed to the forehead of Keats; Walter Scott's pulse rose; Tchaikovsky felt an immeasurable bliss; faint electric sparks played round the wavy masses of Swinburne's hair; and Beethoven's eyes bulged, flashed, and rolled!

Harding has suggested several aids to coax inspiration. Periods of elaborating on a bright idea need to be followed by periods of setting aside the work for a while. This helps the mind to forget

constraints and fetters so that fresh ideas and perspectives emerge. As she puts it, "There is much to be said in favour of laying a work aside to mature; for one thing it gives the judgement time to operate; the mind is able to return to the work from time to time with a fresh outlook, and check it from many different angles."<sup>9</sup> She also recommends to carry on several projects at a time both for cross-stimulation and to alternate work to overcome fatigue. Several creators, such as the scientists Cavendish and Raleigh and the writers Jane Austen and Robert Burns, worked on several projects simultaneously. She also recommends visualizing or envisioning a solution by working through images, metaphors, and cues. Another trick is to read or hear creative masters to get inspiration going. Since inspirational ideas tend to fade quickly, it is useful to jot down bright ideas whenever they come. Thomas Hardy, for example would get many of his ideas while wandering in the countryside. He used to jot them down on large dead leaves, chips of wood, and pieces of slate!

The fixed stages Wallas model, and its variants, seem to work well in a discovery-type problem in which illumination is the pivot of the creative problem-solving process. What about problems in which designing, elaboration, aesthetic form, expression or representation, venturing, and so forth are key? Does the Wallas model work as well in elaborative, expressive, entrepreneurial, existential, or empowerment creativities? Probably not. In these creativities, although bright ideas have a role, frequently it is how ideas, feelings, beliefs, facts, judgements, actions, and expressions are elaborated, linked together, and contextualized that determines the uniqueness, novelty, and value of the creation. The creative process may need to be much more complex, fluid, and organic. The box on *Mechanisms of the Creative Process in Art* summarizes some research on the complexity and fluidity of the process of artistic creation.

#### **Simulation Models**

Besides the four-stage model, there are other models of creative problem solving as well. Some researchers have been attempting to simulate human problem solving on the computer. Their work sheds light on creative problem solving. They have been attempting to develop computer programs that solve a wide range of problems also solved by humans, such as programs for playing chess, making medical diagnoses, generating laws of science, etc. As some of them have put it, creative activity appears simply to be a special class of problem-solving activity characterized by novelty, unconventionality, persistence and difficulty in problem formulation.<sup>11</sup> They, therefore, search for those 'heuristics' or thumbrules that the mind uses in finding creative solutions (by having subjects think aloud as they attempt to solve problems), so that these can be utilized in the computer programs for problem solving. A heuristic is "any principle or device that contributes to a reduction in the average search to solution."<sup>12</sup> Some examples of heuristics for creative problem solving that the mind uses are: try something counter-intuitive, make the familiar strange, generate hypotheses from an episode or a case, use analogies, account for

## **Mechanisms of the Creative Process in Art**

Five notable artists, namely, a painter, a poet, a sculptor, a novelist, and a photographer (who were also teachers) were interviewed about their respective creative processes.<sup>10</sup> Together they agreed upon over 40 mechanisms they considered essential to the creative process in art. Interestingly, several of these were feelings, such as feeling free from distractions, feeling an empathy for life, a feeling of being centred in one's self as well as the world, a feeling of being simultaneously separate from the work of art as well as involved in it, a feeling of losing oneself, the excitement of a possible unfolding, a feeling of autonomy for oneself and for one's creative urge, and so forth. Some were beliefs and perceptions, such as moving from the real world into an imaginary world; enlargement of one's self where gender did not matter; looking at the work as if it was not one's work; sensing, seeing, and hearing resonances; heightening perception, an expansion of awareness; giving up the analytical to trust the intuitive; imagining the work from different perspectives; entering a deeply altered state of consciousness; and so forth. Some seemed cranking up, preparatory operations: getting started; letting the work shape one's life; travelling somewhere to expand experience and understanding; researching; discovering and using one's most productive work times; acquiring plenty of materials to work with; or struggling to find time to work. Some mechanisms seemed incubatory in character: needing time to digest experience in order to change; leaving the work alone for a while and exploring the work of others; and leaving it alone for a while to plan other works. Connecting with one's own previous work as a resource included building on past experiences; seeing/comparing present work in the context of past work; carrying something from one's past work into the new work; a dialogue with one's self for idea cycling and saving. There were mechanisms of risk or initiative taking: experimenting, tearing apart; risking failure and starting over; and extending oneself, taking on more difficulties. Opportunism was also in evidence: taking advantage of luck; riding on momentum; and expending great energy. There were evaluatory mechanisms, such as critically distancing oneself from one's work and paying close attention. Refinement/ 'optimization' mechanisms included reworking and increasing the richness of the basic work; keeping perspective with occasional social contacts; and selecting, planning, finding courage to leave material out. There were also

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distancing/detachment mechanisms used on completing the work: accept failure and plan new works.

With the help of a computer programme called Interpretive Structural Modelling, the researchers attempted (in interaction with the artists) to seek answers to two questions. (1) Is there a hierarchy of importance among these mechanisms (sought by taking pairs of mechanisms and asking the artists which of the two in each pair they considered more important in their creative process)? (2) Did some mechanisms precede others (again, by asking the artists which of the two in each pair they considered occurring before the other)? The hierarchy of importance that emerged was not acceptable to the artists, since they felt that the creative process was an organic whole in which every mechanism played its due role. But they were more comfortable with the precedence or sequencing hierarchy that emerged. Mechanisms labelled centring preceded those labelled expanding, which preceded creating, which preceded revitalizing, which preceded distancing/renewing/separating, which preceded evaluating, which preceded restarting. As many as 10 mechanisms were included in centring and these included feeling free from distractions, feeling empathy for life, getting started, and struggling to find time to work. 8 mechanisms labelled expanding included moving from the real into the imaginary, travelling to expand experience and understanding, and entering a deeply altered state of consciousness. Creating involved 11 'doing' mechanisms and 5 'feeling' mechanisms. Doing mechanisms included experimenting, tearing apart, riding on momentum, reworking and increasing the richness of the work, and imagining the work from different perspectives. Feeling mechanisms included losing oneself, and finding a more powerful, genderless self. Revitalizing mechanisms included risking failure. Distancing/renewing mechanisms included leaving the work alone for a while, occasionally making social contacts to restore perspective. Evaluating mechanisms included criticizing one's work and looking at it as if it was not one's work. Restarting included accepting failure and planning new works.

Clearly, collapsing the creative process, especially in the arts, into just preparation, incubation, illumination, and verification or some other arbitrary number of small, sequential stages would be to miss the trees for the wood! The process is much richer. Feelings play a key role. There is some broad sequentiality, but many mechanisms are more

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or less simultaneously used, too. There may well also be cyclicity: a mechanism A triggering another mechanism B, which triggers C, which in turn triggers A. The creative process in the arts seems to coopt the full self— heart, mind, spirit; imagination and discrimination; focus, energy, and detachment.

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exceptions, investigate paradoxical incidents, play with ideas, etc. Herbert Simon, a Nobel laureate in Economics, has given interesting examples of how a computer program named BACON can, in minutes, rediscover from data fed to it Planck's law of black-body radiation, Kepler's third law of planetary motion, the law of conservation of momentum, and so forth.<sup>13</sup> As he puts it, "If a program can make discoveries that, if made by a human, would be regarded as creative, then the processes it used...will tell us something about the creative process."<sup>14</sup> He suggests that creative discoveries are likelier when three factors converge in a person: (1) in-depth knowledge of the field; (2) an acute sensitivity to anomalies, oddities, inconsistencies, and paradoxes–problem sensitivity; and (3) effective problem solving heuristics.

#### **'Primary Process' Thinking Models**

Then there are models of the creative problem-solving process that stress the importance of non-analytical 'primary process' thinking . An interesting point noted by researchers is that creative ideas, whether in the arts or the sciences, frequently occur not only after hard problem analysis, but also during reverie-like states when the conscious, analytical mind has been coaxed away from the problem. Ernst Kris has described this phenomenon as regression (to childhood style fantasying) in the service of the ego.<sup>15</sup> Coleridge describes how, having fallen asleep after taking a painkiller, he composed 200–300 lines of the poem *Kubla Khan* during sleep. Poincaré, as described earlier, got his illuminations not only *after* hard struggles with his problem but while he was vacationing and not thinking consciously of the problem. Kekulé dreamed of serpents going round and round and chasing each others tails, and that apparently provided him with the insight into the ring-like structure of the benzene molecule.

Research on the creative process indicates not only that bright ideas are likely to occur in reverie-like states, but also after stimulating experiences. For example, artists who were shown superimposed slides tended to show more creative drawings than artists who were shown the slides without superimposing them on one another.<sup>16</sup> On the other hand, prolonged sensory deprivation may impede the flow of bright ideas,<sup>17</sup> as also mentally taxing prior tasks.<sup>18</sup> Prior

 $play^{19}$  and humour^{20} stimulate bright ideas. Further, fantasies often play a part in producing creative solutions.^{21}

Gregory Feist's research indicates interesting differences in the creative problem solving processes in the sciences and the arts.<sup>22</sup> He gave problems like how members of a species could have developed male and female organs to science students and writing haiku-like poems based on photographs to arts students. Feist studied their openness to experience (based on Ernst Kris's concept of regression in the service of the ego) vis-à-vis seven scales. He differentiated between primary process thinking (during which many fluid contributions or syntheses take place, as during reveries) and analytical or evaluative 'secondary process' thinking. One of his interesting findings was that the arts students while composing poems maintained fairly even levels of *both* primary process, synthetic thinking as well as analytical, evaluative thinking before their getting an insight or illumination, say about the theme of the poem, during the insight stage, and also the post-insight evaluation stage. That is to say, during creative problem solving, divergent as well as convergent thinking remained more or less simultaneous. Not so vis-à-vis the science students. As they tried to solve the scientific puzzles given to them, while divergent thinking declined during the insight and evaluation stages, analytical thinking picked up during these two stages. Feist's findings suggest that different kinds of creativity may require different sorts of creative problem solving processes. In a discovery or essence type of creativity situation, there may be hectic divergent and convergent thinking **before** an insight or illumination occurs, as the mind thinks up alternative solutions and discards them; but once an acceptable insight or discovery has occurred, divergent thinking gets de-emphasized and evaluative thinking dominates. In inspiration and its elaboration type of creativity situations, both divergent and convergent thinking get roughly equally utilized because even after the main inspiration, its elaboration (in creative literature, professional work, technology development, and the arts) requires a series of smaller inspirations that must also be evaluated before proceeding further.

#### **Personality Traits and Emotion-based Models**

Based on his study of 22 Western Nobel laureates in the sciences, medicines, and physiology, Albert Rothenberg identified several interesting features of their creative problem solving processes.<sup>23</sup> First, they indicated intense involvement with the theme or issue they were after. Interestingly, many of them moved away from the subject of their mastery into a fresh niche, one that was not heavily worked, and energetically set about getting the needed expertise. As Rothenberg disclosed, "Together with the knowledge of important themes, there was a specific motivation to create; to produce something both new and valuable. All of the subjects had known at an early stage that they wanted to produce new solutions...Also, they had been exquisitely sensitive to and aware of the potential importance and value of such a new solution in the area or field."<sup>24</sup> Second, these scientists worked with opposing ideas that precipitated a fresh insight

representing a synthesis of these opposing ideas. For example, Darwin worked with the idea of the extinction of species maladapted to their ecologies versus the survival of the adaptive variants of these species, and came up with the idea of natural selection that accounts for both extinction and survival. Dirac worked with the opposed ideas of holes and negative energy versus particles and positive energy and synthesized these into the notions of positron and antimatter. And Einstein struggled with the falling motion in a gravitation field versus matter being at rest in the gravitational field, and resolved this through his general theory of relativity.

Certain problem solving dispositions influence the creative problem solving process and its outcome. It has been asserted by Kirton that there are two basic kinds of problem solvers–the adaptors and the innovators.<sup>25</sup> The adaptor responds to a problem situation keeping in mind the conventions, norms, rules, and the context of the group he belongs to. The innovator is inclined to ignore these conventions, to question givens and assumptions, and to restructure problems. Therefore, the innovator tends to engage in wider divergent thinking than the adaptor. Kirton has developed the Kirton Adaptation–Innovation Inventory (KAI) whose high score indicates the individual's innovator orientation while a low score indicates an adaptor orientation. In research involving the staff of advertising and design units, the KAI scores of the staff members were correlated with scores on divergent thinking test.<sup>26</sup>

A similar distinction has been made by Martinsen. He divided problem solvers into assimilators and explorers.<sup>27</sup> The assimilators like familiarity, and so they search for solutions that are not too novel. The explorers prefer novely, and so they search for novel solutions. In a study of Norwegian youngsters, Martinsen found that in attempting to solve 'insight' or tricky problems, the assimilators performed better when they had a lot of expertise relevant to the problem situation, while the explorers performed better even with a low level of situation-related expertise. Thus, explorers are more likely to find creative solutions in ill-defined and unfamiliar situations than assimilators.

Feelings and emotions can influence the creative problem solving process in interesting ways. Todd Lubart and Isaac Getz have suggested that emotions may play a central role in generating useful metaphors, which, in turn, may give a direction to creative thinking.<sup>28</sup> For instance, the sense of awe one feels at studying a creative genius may remind one of a mountain, which may lead one to a metaphor such as 'peak of genius'. This can direct enquiry into what sort of creativity is of the highest quality, how we would recognize it, how it comes about, and how we could utilize it. A domain of action may emotionally resonate with another domain, and lead to a fruitful metaphor. For instance, slums are an eyesore and a blot on civic administration, so that slum clearance is a major issue in many cities. The domain of slum clearance may evoke feelings associated with cleansing, which may remind one of how mothers purge their children's bowels once in a while and how Christians go to a church to cleanse themselves through the confession of sins. So, now we have purgation and confessing as two processes that metaphorically get linked

with slum clearance. This may lead to such ideas as providing credible mentors to slum dwellers to help them leave the slum or clean it up, and providing them lucrative opportunities for exiting from the slum. As Lubart and Getz point out, emotion can contribute to creativity in several ways. The pleasure of taking up a challenge can energize creative problem solving; mood elevation called hypomania can stimulate divergent thinking; emotions can evoke associated ideas; emotions can place the creative problem solver in a different state of awareness and thus facilitate noticing of cues that otherwise may be missed. Emotions can, however, also impede creativity. David Carson and Mark Runco point out how stress-related emotional behaviour of aggressive confrontation, or escape-avoidance, or excessive burdening of oneself with responsibility tends to impede creative problem solving.<sup>29</sup>

#### **Cognitive Capabilities Models**

The ability to link together categories to produce new ones may yield original and high-quality solutions. Michael Mumford and his associates provided subjects three groups of four related items.<sup>30</sup> Their task was to combine these items into a new category, give it a label, a one line description, and examples of the new category. For illustration, Table 10.1 shows three groups of items.

TABLE 10.1Groups of Items

Group I	Group 2	Group 3
chair	tire	Mars
couch	seat	Jupiter
lamp	wheel	Earth
pictures	brakes	Venus

A little thinking may reveal that Group 1 consists of furnishing items, Group 2 of automotive items, and Group 3 of planets. The task is to think of a super-category that covers furnishings, automotive items, and planets, such as manned vehicles for planetary exploration. The researchers found that the quality and originality of the features of the super-category and its examples were correlated with the quality and originality of the subjects' solutions for two other tasks. The researchers commented, "…it appears that people's ability to combine and reorganize categories to generate new concepts is related to the ability to produce original, high-quality products on creative problem solving tasks."<sup>31</sup> Indeed, this and other researches of Mumford and associates indicated that the ability to construct interesting problems or structure problems in interesting ways, the ability to code information in interesting ways, the ability to select interesting

categories and combine them in novel and yet appropriate ways was associated with the subject's ability to produce high-quality, original solutions.<sup>32</sup>

#### **Structured Problem-Solving Models**

There have been some full-fledged programmes for effective problem solving, some of which specialize in finding creative or innovative solutions. Kepner and Tregoe's well-known programme of effective problem analysis for decision making involves a number of steps:<sup>33</sup> (1) establishment or identification of an expected standard of performance of a system; (2) identification of where deviation is taking place for this standard; (3) identification of the cause(s) of the problem by isolating that which has changed in the functioning of the system from that which has not changed; and (4) examination of whether the presumed cause(s) explains all or most of the system's performance deviance. Decision making follows problem analysis, and this involves steps like formally stating the purpose of the decision, establishing objectives, classifying and weighting objectives, generating alternatives, evaluating risks, and making the final choice. The Kepner and Tregoe programme has been found useful in solving many technical problems, especially of mechanical systems. Its strength lies not in divergent thinking but in helping the problem-solver understand and structure the problem precisely.

A programme that combines both convergent and divergent thinking mechanisms is the one developed by Sidney Parnes and his associates.<sup>34</sup> The problem-solving programme is in five stages–(1) awareness of the 'mess' or problem situation, (2) fact-finding, involving listing down or otherwise discovering all the facts pertinent to the problem situation, (3) problem finding or fairly precise statement of what the problem is, (4) idea finding, in which such techniques of divergent thinking as brainstorming are used to come up with a wide range of possible solutions, (5) solution finding, in which the alternative solutions are assessed against criteria of evaluation to generate a small number of feasible solutions, (6) acceptance finding, or getting a system to accept one of the feasible solutions, (7) implementation of the selected solution. Practice in using this programme of creative problem solving seems to lead to appreciable increases in such aspects of creative intelligence as fluency, flexibility, originality, sensitivity to problems, elaboration, etc.<sup>35</sup>

Some parts of a sequential programme for creative problem solving (like that of Parnes and his associates) may be more appropriate for problems involving essence creativity than for problems involving elaborative, expressive, entrepreneurial, existential, or empowerment forms of creativity. In a sequential programme, the phase of divergent thinking is separated from the phase of evaluation. This may work well for insight- or discovery-type problems involving insight and its evaluation. But in many problems, ideation and evaluation are repeated over and over again. If one is writing a story, almost every word or phrase would have to be evaluated for appropriateness as it is written. Any innovative venturer would need to evaluate every step that he

takes as the step is taken, not after the venture is over. This is also true of someone seeking to actualize his/her potential or that of others. As Dennis Brophy has surmised, any real-life, elaborated, complex, creative problem-solving process would "entail considerable convergent and divergent thought in continuing alternation."<sup>36</sup> Indeed, Runco's research on children's creativity has found that ideation and evaluation are correlated, that is, the more the ideas generated, the more the evaluation, and vice versa.<sup>37</sup> Even in the technique of brainstorming, evaluation of whether or not an idea offered is a response to the problem situation must occur in the mind of the proposer, except that the evaluation criteria are pretty liberal, far more so than the stage at which formal evaluation criteria are relatively consciously applied to the generated alternative solutions. Whenever we exercise choice, some form of evaluation would accompany it. What needs to be avoided in creative problem solving is ego-bruising evaluation of ideas that are offered, such as calling someone stupid for offering an idea. This sort can cramp divergent thinking. Evaluation that is objective, factual, and offered in an encouraging, constructive spirit as feedback may well spur high-quality divergent thinking.

Our review of the work on creative problem solving suggests that a number of mechanisms are available for effective convergent and divergent thinking. Some are useful during problem structuring, some during the search for creative/ innovative solutions; and some during the solution selection and solution refinement stage. These mechanisms–call them heuristics if you like–are summarized in the next two sections.

## **USEFUL MECHANISMS OF CONVERGENT THINKING**

As originally understood, convergent thinking consisted of those abilities (good memory, logical ability, etc.) that helped a person to get to the right solution in problems that had one right solution.<sup>38</sup> It may, however, be more useful to view convergent thinking as consisting also of *mechanisms of thought* that help the person to converge to a good definition of the problem when the problem is complex or vague, to analyse the problem in depth, converge to a solution (or the method of getting to a solution) out of many that may be available, to put together a solution from various components and partial solutions (that is, to synthesize a solution), and to refine a solution and make it efficient—in other words, mechanisms that facilitate focus and choice.

These mechanisms may be grouped under those that help to *clarify* problems, those that aid the process of *analysis*, those that *mobilize* mental effort, those that lead to a *synthesis*, and those that help in the *refinement* of the solution.

#### **Clarificatory Mechanisms**

A problem, it may be recalled, is a puzzle or an unmet goal or an unwanted effect often accompanied in ill-defined problems by insufficient information as to what is wrong, why it is wrong, how to set it right, and/or what would constitute setting the problem right. Thus, problems often amount to a state of mental confusion, so that clarifactory mechanisms are among the first to be evoked. *Verbalizing* a problem, putting it into language, is a very important clarificatory mechanism both for viewing it more clearly and for enlisting the help of others. *Defining* key terms of the problem is another, as also *clarification* of key issues, constraints, etc. that need to be kept in mind in formulating a solution. *Listing the components* of the problem is another useful clarificatory mechanism. Since clarification largely involves the process of familiarization, close *analogies* and *comparisons* are also useful mechanisms. For instance, faced with a confusing strike of employees, one may think of other strikes that were faced in the past for clues to what triggered the present strike and what shape it might take. Somewhat more sophisticated clarificatory mechanisms are attempts to *display* the problem situation through charts, diagrams, etc. Mere clarification can sometimes trigger a solution.

#### **Analytical Mechanisms**

Analysis involves several related processes. One process is that of breaking a problem down into its components (problem factoring). Another process is that of seeking *relationships* and *components* such as through establishing a priority among them and through *classifications* and *cross-classifications*. A third process is that of identifying the *steps* to a possible solution. A fourth one is of *transforming* components of a problem into more *abstract* forms (such as through the use of mathematical or other symbols and equations).<sup>39</sup>

Several other mechanisms that aid analysis may be noted. One is of *imposing constraints* on a problem, such as by making assumptions. Another is the mechanism of identifying the *criteria for evaluating* and choosing among alternatives. A third is one of working *backward* from a solution to the present situation. A fourth is one of building a *model* of the problem situation and manipulating its components to see alternative outcomes, as in computer simulation of an aerial war, or in sensitivity analysis in which a machine's tolerance to high stress on it is tested. A fifth is the use of a *broad map* to organize the information, such as the use of Maslow's self-actualization model to organize information on the employees' need satisfactions.

Transforming the problem into an abstract form is especially valuable. Ignoring needless detail, the mind can then focus on the few essential variables, parameters, and relationships, and work out the solution relatively quickly. The national economy is enormously complex. Predicting its state next year or at the end of a period is often vital for planning purposes. It is by reducing the economic system, with all its factories and farms and institutions and consumers, into

a few variables like the volume of aggregate saving, investment, employment, money supply, government expenditure, and so forth, that the required predictions become feasible. Many engineering problems are tractable only when they are transformed into mathematical forms, and developing a model is an essential prerequisite for any architectural work. Model building is, thus, a very important analytical tool.

As an example, the problem of student indiscipline can be factored into several sub-problems: why students don't want to study, why teachers are found boring, why students don't see the relevance of what they have to study to their career objectives; the adequacy of classroom and other facilities, political influences on students, the home background of students, and so on. Some attempt can be made to see which of these factors are critical and which are not very important and also whether they are interrelated. For instance, student motivation to study may be related to the ability of the teachers to teach and to the perceived relevance of the materials studied to careers. The sub-problems can be classified in a number of ways. Some may be psychological in nature (motivation to study); others may be sociological in nature (home background of the students); still others may be economic or political; and so forth. Based on theory, or previous experience, or empirical studies, models can be developed in which student alienation or dissatisfaction can be expressed as a function of teaching ability, deprivation at home, irrelevance of material taught to careers, etc. By manipulating these symbols and seeing the resulting consequences for student alienation, one can secure valuable insights into the dynamics of the problem. These insights can sometimes help one visualize the solution.

#### Synthesis Aiding Mechanism

Synthesis is the act of seeking a pattern among components, a whole in the parts, a relating of the previously unrelated, a unity in the diversity. This is an important mechanism for converging to the solution of a complex problem. A mechanism that aids synthesis once analysis is made is that of *aggregation*. Simply putting in one place the various strands of thought or the various parts of a complex situation in the form of brief notes often triggers the act of synthesis. *Incubation* (sleeping over a problem) also is known to help in synthesis. *Juxtaposing* contradictory or *inconsistent* or *extreme* elements in a problem situation (highlighting a *paradox*) may energize the mind to seek a solution that harmonizes the inconsistent elements. Ferreting out conditions under which incompatible elements become compatible is another synthesizing or harmonizing mechanism.

## **Optimizing Mechanisms**

Optimization is the process of *refining* a solution until the solution is of acceptable quality. It involves a number of mechanisms, such as *substitution* of parts, *addition* of components, *deletion* of unnecessary ingredients, *modification* of elements, *alteration* of the relations between the

components, and so forth. Use of *specific criteria* for evaluating different solutions often helps the mind to shear away the frills of these solutions and leads to an "optimal" choice.

Table 10.2 lists the various mechanisms of convergent thinking.

### TABLE 1 Mechanisms for Aiding Convergent or Focus Thinking

Clar	ificatory mechanisms
	Verbalize the problem (problem definition)
	Define key terms, clarify key issues and constraints
	List the components of the problem
	Familiarize oneself with the problem through close analogies or comparison with known situations
	Use charts and diagrams
Ana	lvtical mechanisms
	Factor the problem into sub-problems
	Seek relationship among components of the problem (e.g. by establishing priorities, by cross-classifying components, etc.)
	Symbolic representation of components and their relationships
	List the steps by which one can go from the current situation to a potential solution (planning)
	Use a broad conceptual map to organize the information
	Impose constraints on the problem, for example by making assumptions, by establishing evaluation criteria
	Work backwards step by step from an ideal solution to current reality
	Build a model of the situation, and manipulate its crucial variables to see outcomes, as in a simulation
Synt	thesis-aiding mechanisms
	Put in one place the various analysed ideas and informations concerning a complex problem; aggregation
	Fit parts or components or modules together
	Incubate (sleep over a problem) for integration/insight
	Highlight contradictory elements in the problem situation, or take extreme situations and try to explain them, or identify conditions under which incompatibles become compatible
Opt	imizing mechanisms
	Substitute parts of the solution by more useful parts
	Add useful components to the solution
	Delete unnecessary ingredients of the solution
	Modify the elements of the solution
	Alter relations between the components of the solution

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**TABLE** 10.2 ↓

Develop criteria for evaluating alternative solutions and for choosing the optimal solution

## **MECHANISMS OF DIVERGENT THINKING**

Divergent thinking involves search for solutions that may involve substantial departures from the beaten track. It involves using approaches or perspectives that may be uncommon or unusual, often resulting in a variety of solutions, some of which may be quite novel. Divergent thinking is obviously indispensable for creative problem solving because it greatly expands choice. To be able to identify mechanisms that enable a person to engage in divergent thinking, let us look at some of my recordings of individuals thinking aloud as they grappled with a difficult, multi-solution task that forced them to engage in divergent thinking.<sup>40</sup> These records of problem-solving efforts are called protocols, and they are used widely in research on problem solving.<sup>41</sup>

The problem I gave to the subjects, all students at the Indian Institute of Management (Ahmedabad), was that of listing things that are green, liquid, and funny. The subjects were asked to articulate all that came to their mind as they struggled with the problem, no matter how irrelevant it might seem to them. Their protocols were tape recorded. Let us first look at two contrasting protocols.<sup>42</sup>

1. "One is a green liquid with bubbles and light and is going round and round in those glass containers you have as decoration pieces. Then I can think of those plastic monsters. I don't know why I find them liquid...because they are so soft and pliable. I always think of monsters and water, like the Loch Ness Monster...so they are green, funny, and liquid...Frogs ..... they are not liquid, but they plop so I guess you can call them green, funny, liquidy if not liquid...Mossy water...Is not funny but it is green and liquid...There's that glue-like thing with which Sikhs fix their beards that's green and liquid and which is very funny. I thought of a beard and it spilling out-or use it to stick paper with and always spills out because it is not meant to stick paper...then it is very funny...Then, any sort of liquid food which grows green with fungus-it is funny in a sort of way if you are not expecting it and you let it lie over there and then eat it or drink it...and of course water-swimming pool water. It is funny because you laugh so much and you have so much fun with it and you can do so many funny things in it...Similarly the sea or any other water...I thought of someone wearing green liquid clothes, which is very funny...Or a compact which is green and liquid and which is always sliding out of my hand. Or imagine having people around you that are green and liquid...or people in the family which is green and liquid which is just sort of runny–I mean spreads all over the place and you don't know what people are like because they keep on changing shape...Or imagine oneself to be green and liquid and others want to know that it's you, and what funny things one can do!"

2. "Now here there are two alternatives. First, list objects, which have all three properties at the same time. Second, list objects that are either green *or* liquid *or* funny. I suppose the first is desired...Let me not generate too many alternatives but instead list objects with all three properties...There are liquids known to have funny properties, for example, polywater–green polywater! What else...? Green clowns made of water or mercury...How to keep him together?... Certain wines... Absinth. What else? *Bhang*\* is light green, liquid, funny... Let me list objects that have one of the three properties and then fit other properties... Liquids... moving... not green... Green waters of lake... chemicals... Some funny chemicals change colours at various temperatures... green... leaves... some cause itching... itching solution... grass... green, green, grass... Funny situation and liquid... I suppose fluid situation will do... funny... jokes... green stands for fresh or inexperienced, so fresh or inexperienced jokes? No... Ah yes! Suppose fluid creatures inexperienced at making love would be green also, funny also...".

Notice that both subjects have exhibited considerable divergent thinking. The first subject speaks of a family, which is green and liquid and spreads all over the place "and you don't know what people are like because they keep on changing shape"! The second speaks of fluid, green creatures comically making love! And yet their approaches are very different. There is very little explicit problem analysis by the first, but a lot of playful associative thinking and elaboration on themes. In the case of the second, there is a great deal of problem analysis—an attempt at identifying alternative interpretations of what the problem is, an attempt at making explicit the way of seeking solutions, an attempt at listing systematically objects of a class, and an attempt at redefining the 'givens' of the problem (liquid = fluid situation; green = fresh or inexperienced).

The two protocols taken together exhibit some of the major tools of divergent thinking.

- 1. Developing a fresh working definition of the problem by re-defining the key terms and their meanings, such as green to mean also inexperienced and liquid also to mean fluid in movement
- 2. Searching for solutions, beginning with the most familiar and then, through playful *associative* thinking (X *reminds* one of Y and Y *reminds* one of Z etc.), expanding the search to bring into the consciousness more and more far out alternatives (a

<sup>\*</sup> an alcoholic Indian beverage.

supplementary mode is to *list* relevant objects and resources and thus activate divergent thinking.)

- 3. Evaluating solutions against task requirements *without getting discouraged* by the results of the evaluation (in other words, using the evaluation as a springboard for further exploration, rather than for negative self-assessment.)
- 4. Allowing the *imagination* to take over at some point, that is, allowing the mind to create *artificial solutions* not having an objective existence, that, however, meet problem requirements, such as fluid, inexperienced creatures making love or a green and runny sort of liquidy family.

Besides these, there are other mechanisms of divergent thinking. Once what needs to be done is fairly clear, *brainstorming* or generating many alternatives becomes useful, for quantity, as Osborn emphasized, tends to beget quality.<sup>43</sup> The mechanisms involved in copious production of ideas are playful free association, suspension of evaluation and negative thinking during ideation, and acceptance and encouragement of the bizarre and the unconventional.

Some problems are intractable unless fundamentally new perspectives are brought to bear on them. So long as the problem-solver is in a groove, he is unlikely to visualize radically different perspectives. The act of creation is facilitated by destroying the mental mould ('creative destruction'). One mechanism that may help this is to ask, "What is the *opposite* of the conventional approach or solution?" Another is to *question the very assumptions* on which the current approach rests, especially assumptions that are so basic that they are often unstated (for instance, the assumption commonly made by economic planners that poor people want, above all, more goods and services). A third is to distort deliberately the constraints in a problem situation; ("What would happen if the required solution is magnified 10 times or minified to a one-tenth of its present specifications?", "What would happen if in the class there were 1000 students instead of 100?".)

Problem solving, especially divergent thinking, uses up energy. Hence, without sufficient motivation, problems may not be solved creatively. A high state of *involvement* with the problem is often necessary. One mechanism that builds up motivation to solve the problem innovatively is that of *magnifying the negative consequences* of not solving the problem, like visualizing a bloody revolution if people do not get entertainment inexpensively. Another related one is of *experiencing* the full reality of the problem (case studies and simulations attempt to do this for students otherwise insulated from reality), so that the person sees the relevance and urgency of the problem. *Empathizing*—the practice of putting oneself in the situation the other person is in is a third related—mechanism.

Certain types of analogies to the problem situation also stimulate divergent thinking.<sup>44</sup> If we look for an analogy in an entirely *different field*, and try to understand its mechanics, we may

stumble upon unsuspected insights into the original problem. Nature is a vast reservoir of fruitful analogies for problems in the mechanical sciences and also in the social sciences. Understanding how a whale can make a mile-deep dive can help us gain ideas on submarine diving. How ant-hills are air-conditioned may provide us with ideas on inexpensive ways of air-conditioning human habitations. How a forest grows back after a fire can help us identify novel mechanisms for the recovery from calamity of war-ravaged communities. Most fruitful are analogies from entirely different fields from the problem situation that are close enough—but not too close. When problem solvers have got into a rut, sidetracking through humour or story or physical activity can unfreeze the mind. Table 10.3 lists various mechanisms of divergent thinking.

 TABLE 10.3
 Mechanisms of Divergent, Choice Enhancing Thinking

- I. Development of a fresh or novel definition of the problem
- 2. Listing of relevant objectives, resources, etc. to enlarge scope and choice
- 3. Using associative thinking to bring to consciousness more and more far-out ideas and alternatives
- Evaluating solutions to search further rather than for negative judgements of the persons proposing them; particularly useful would be seeking or giving of constructive feedback with encouragement to divergent thinking
- 5. Allowing the mind to synthesize imaginary solutions
- 6. Brainstorming, that is, aiming at generating many solutions by suspending critical evaluation and by encouraging the mind to generate unconventional alternatives
- 7. Searching for solutions that are opposite to the ones that are conventionally advanced
- 8. Questioning the basic assumptions on which the current approach rests
- 9. Distorting, or even temporarily ignoring, problem constraints to facilitate the conceiving of far-out possibilities
- 10. Getting involved with the problem by magnifying the negative consequences of not finding the solution, or by empathizing, or by fully experiencing the magnitude of the problem
- II. Creating interesting far-out analogies to the problem situation and an exploration of their mechanics
- 12. Diverting attention from a mental set or obsession; sidetracking the mind so that it returns without blinkers to the problem situation.

The capacity for divergent thinking depends in good measure on the mastery of these mechanisms. Witness the following protocol of a person for the task of listing green, funny, and liquid things.

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#### **TABLE** 10.3 ↓

"Green, funny, liquid... Green I can make out... tree... But it must be liquid also... I hope it is combination of all three... must be... green, funny, liquid... green, funny, liquid... Something out of tree but may not be funny... Some sort of gelatine-like thing I have seen in movies... Funny is too general. I just can't figure out what this funny is... Funny... Green and liquid I can make out but funny is not so clear... Some drink and ice cream... some small worm in green colour moving about... Worm contains some liquid... Man from Mars who may be in liquid form and green colour... this can be green, funny, and liquid... Green can be so many things... funny... funny... and liquid... green, funny, and liquid?"

Notice that this person either did not use, or used only minimally, many of the tools of divergent thinking listed earlier. For example, there is little evidence of systematically using associative thinking, such as by asking, "Now, what all things does green (or funny or liquid) remind me of?" Nor did he try to activate divergent thinking by attempting to list green or liquid or funny objects. He did not try to restate the problem by enquiring into what alternative meanings the words green, funny, and liquid have. Nor did he attempt to brainstorm or let his imagination take rein, to concct fanciful solutions, except for the fancy concerning green Martians. Nor, apparently, did he get sufficiently involved with the problem. No wonder, therefore, that this subject was not able to generate many solutions, and clearly felt rather stumped.

## **CONCLUDING COMMENTS**

A basic understanding of creative problem solving is indispensable for lifelong creativity. Creative problem solving is complex, elaborate, and stressful. Most of us most of the time seek quick fixes for our problems. These may be alright for the ordinary business of life. But if our intention is to alter the business of our lives, and keep altering it throughout life (which is what lifelong creativity means), it is essential that we not only understand creative problem solving, but master it. The more we utilize it, the better we would get. We would learn to home in quickly on the sort of divergent and convergent thinking; we would use more effortlessly various mechanisms of divergent and convergent thinking; and we would get more productive in getting to high quality novel *and* appropriate solutions. Some people get very good at creative problem solving. They may not be born prodigies, but they develop a prodigious capacity to make creative breakthroughs. These are the people we call geniuses. We could join their ranks.

The creative problem-solving process we have sketched in this chapter is broadly relevant to all the forms of creativity we have described in chapters 6 and 7. But there are some differences. For instance, the process required for essence creativity is what Graham Wallas conceptualized long ago-partially overlapping but broadly sequential phases of preparation, incubation, illumination, and verification. There may be one or more cycles of convergent and divergent thinking but usually there are clear separations between the two modes of thinking. There is a great deal of divergent thinking before illumination and a great deal of convergent thinking after illumination.

In the case of the remaining creativities, the divergent thinking process does not end with illumination/inspiration. Elaborative, expressive, entrepreneurial, existential, and empowerment creativities tend to be stretched out, with many modest illuminations and many closely-knit convergent–divergent cycles. In essence creativity, testing and evaluation of the fresh idea are concentrated at the end of the creative problem-solving process, and usually need to be rigorous or credible. Testing and evaluation tend to be pretty dispersed throughout the creative problem-solving process in the other forms of creativity. One more difference is that essence creativity is usually a solo effort while most of the other forms–especially elaborative, entrepreneurial, and empowerment creativities–are frequently collective efforts, and issues of management and coordination become prominent in such cases.

## Quiz

Are the following statements true or false? Why?

١.	Convergent thinking is merely logical thinking.		
2.	Divergent thinking consists of having fantasies.		
3.	There can be creative problem solving without a good deal of problem structuring.		
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4.	. Motivational factors are unimportant in problem solving.		
5.	A lot of both convergent and divergent thinking is necessary in problems that are difficult, open-ended (that is, likely to have many answers), and ambiguous.		
6.	Brainstorming is a major tool of divergent thinking but a new way of looking at the problem (problem restructuring) is not.		
7.	7. There really is no difference between the process of artistic creation and the process of scientific discovery.		
8.	In every problem there is first divergent thinking and then convergent thinking.		
9.	Identifying an ideal solution and then working backwards from this ideal solution to the current situation is useful, but building upon the current situation to locate a solution is harmful.		

MENTAL GYM

Problem solving is a fascinating art. There are many tricks that one can utilize in solving complicated problems. One is to restate or restructure the problem in such a way that either the solution becomes obvious or can be secured by well-known techniques. For example,

 $X^2 - 9 = 0$  can be stated as  $X^2 = 9$ 

when a square root operation on 9 yields the values of X. Another is to work backwards from an ideal solution down to the current problem situation. Often town planners ask to see models of ideal townships to get some idea of how actually to build a feasible township. A third trick is to build up to a solution from the current problem situation, by successively narrowing the gap between the end state and the current situation. When a disaster strikes a region, the government often follows the strategy of alleviating successively less acute distresses until normalcy is restored. A fourth trick is to break-up the problem into a number of smaller problems, solve each separately, and then attempt to integrate the various solutions of sub-problems into a master solution of the original problem, as in designing complex systems like rockets or missiles or computers. While over the years we have learnt to utilize many of these techniques or tricks intuitively, it helps to become aware of them so that we can rapidly shift from one technique to another in our search for a solution to a vexing problem. Besides these, we have at our disposal many of the mechanisms of divergent thinking, such as listing or brainstorming, reexamining or reinterpreting of constraints, etc. Here are some problems. Try and solve them and be aware of the processes by which you found the solution or failed to find one. Take about 3 minutes for each problem.

1. Given a patient with an inoperable stomach tumour, and X-rays which destroy organic tissue at sufficient intensity, by what procedure can one free the patient of the tumour by these rays and at the same time avoid destroying the healthy tissues which surround it?

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2. You have a pile of 24 coins. 23 of these have the same weight. But one of them is heavier than the rest. You are given a scale but no weights. Your task is to identify the heavy coin in no more than three uses of the scale.

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3.

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Without your pencil leaving the paper, draw 4 straight lines that cross all of the 9 dots. Your pencil should not retrace any line.

- • •
- 4. Sometimes, when the problem is complex, it is better to break it up into sub-problems. Then a good solution is sought for each sub-problem. The good solutions to sub-problems are assembled and checked out for internal consistency. The chances are that the overall solution, even if it is not the best possible, turns out to be quite good. The work of specialists coordinated by the common boss is an example of this strategy. Try out the following example. For many years, a large government-owned steel plant has been plagued by losses, strikes, inefficiency and the like. Factor the problem into sub-problems.

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5. Which of the properties of a suitcase you would be able to improve upon?

6. How would you be able to incorporate some of the properties of petals into paper?

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# 11

# **Enhancing Creative Intelligence**



The understanding and measurement of the endlessly multi-dimensional human intelligence is an unfinished agenda. Initially, around a century earlier, some tests were developed to measure intelligence. They measured a number of competencies required for solving problems, such as figural, verbal, and arithmetical logic. This essentially encompassed the ability to find, through logic, the answers to problems with one right answer. They came to be called intelligence quotient or IQ tests.

When creativity research became popular in the 1950s, it became clear that IQ was not an adequate measure for assessing the mental capabilities needed for creative problem solving. Creative problem solving is required for resolving a wide variety of problems that are either ill-defined, or those that are well-defined but have multiple solutions, or those with a single solution (such as discovering the law that explains a puzzle of nature) in which pure logic is not enough, and insight is needed. We have encountered many such

problems in the previous chapter.

In this chapter, we try to examine in some detail various thinking abilities that have been identified to be essential for creative problem solving. These are the mental abilities that facilitate extensive Reason, ruling alone, is a force confusing Kahlil Gibran

divergent thinking. They collectively constitute creative intelligence. While IQ facilitates the solving of a wide range of problems that can be solved logically, creative intelligence facilitates problem solving in an even wider range of problems, those that cannot be solved by logic alone but require considerable divergent thinking. Although the mechanisms of convergent and divergent thinking listed in the previous chapter constitute a good first approximation of creative intelligence, we need to probe further into mental abilities that enable us to practice these mechanisms effectively, and indeed go beyond them. We need to master them, if our efforts at lifelong creativity are to bear a rich crop.

# **CREATIVE INTELLIGENCE ABILITIES**

Creative intelligence consists of several distinct abilities of divergent and convergent thinking.<sup>1</sup> One of them is *fluency*, the ability to come up with a large *number* of solutions for a problem. The second is *flexibility*, the ability to come up with a *variety* of solutions or approaches. The third is *originality*, the ability to come up with novel or unique solutions. The fourth is *sensitivity*, the ability to sense non-obvious puzzles, anomalies, issues, complex feelings, problems, etc. The fifth is the ability to identify the *causes* of a situation as well as the likely *consequences* of the situation. The sixth is *elaborative* ability, the ability to enlarge a core idea into a creation that is unique or novel. The seventh is the ability to *redefine* problems from a fresh perspective. These are some of the most important abilities that, in conjunction with reasonable levels of convergent thinking abilities, such as IQ, help a creator do something that is novel as well as useful; exhibit in its doing much divergent thinking; show new relationships between ideas or facts, and lead one to a considerable transformation of the ideas, facts, or materials with which the creator started. In short, these are the abilities that mainly contribute to creative, as distinct from run-of-the-mill, outcomes.

The presence of these abilities facilitates creation. For instance, in a study of 73 'inner city' American children, most of whom were children of African-American blue collar workers, their scores on tests that measure many of these abilities were correlated with the originality and aesthetic quality of the children's crayon drawings and claywork.<sup>2</sup> Mednick's Remote Associates Test (RAT), believed to measure originality, has been found to be correlated with scientific originality, at least under certain environmental conditions.<sup>3</sup> In another study, fluency was correlated with the creativity of industrial research chemists.<sup>4</sup> Torrance found that many of the children who scored high on his creativity tests, later on as adults engaged in creative activities.<sup>5</sup>

Many people think of creativity as a gift that one has or does not have, so that one can do precious little about one's creativity. Nothing could be further from the truth. Once we realize that creativity is many different abilities, it becomes possible to develop each ability through understanding and practice.

# A MODEL OF CREATIVE INTELLIGENCE

Creative intelligence is largely an appropriate marshalling of convergent and divergent thinking abilities in problem situations. The sequence in which, and the extent to which, such abilities as problem sensitivity, fluency, flexibility, problem restructuring ability, etc., are utilized is still a matter of guesswork. Figure 11.1 displays an approximation of how various convergent and divergent thinking abilities may be marshalled in insight problems as well as in ill-defined, multi-answer problems in the arts, sciences, and other professions.

Basically, the model argues that problem sensitivity (the ability to sense the odd) comes to the fore in the early encounters with a situation, leading to a broad grasp of the problem. The grasp is firmed up by convergent thinking mechanisms (define the problem, anlayse it, categorize it, etc.), and the use of the causes guessing ability that provides a preliminary understanding of why the problem may have arisen. This may lead to a fairly clear understanding of what the problem is-what is the puzzle about, what goal is not being met and why, what are the undesirable symptoms and why, what are the major knowledge gaps that are preventing solutions, what constraints have to be borne in mind while solving the problem, etc. (see Chapter 10). If the problem has no quick solution, the problem restructuring ability may be evoked to recast the problem in a way that a solution becomes possible. For example, a problem of persistent stomach pains may be re-diagnosed as a psychosomatic problem rather than as a purely physiological problem, or a problem of sleeplessness may be seen instead as a case of too frequent waking up at night. This sort of restructuring would evoke fresh approaches and generate much divergent thinking involving fluency (copious ideation) and flexibility (varied approaches, opinions, or perspectives). Originality, or the ability to produce novel or rare and yet appropriate responses may now come into play, culminating in an original or innovative solution. It now needs to be assessed by convergent thinking mechanisms (assessment in terms of 'performance' criteria, constraints, feasibility, etc.). If feasible prima facie, the solution's implications need to be assessed through consequences guessing ability, and tested. Essence creativity may end here. However, if elaborative creativity is aimed at, elaboration ability would be utilized to enlarge the solution through new linkages, contextualization, etc. Finally, the enlarged solution needs to be honed by convergent thinking mechanisms involving refinement/optimization. The model shows the sorts of links that can exist between various convergent and divergent thinking abilities. It does not, though, show the various feedback loops that undoubtedly exist between the elements in real-life problem solving.6

The model highlights two significant aspects of creative intelligence. The first is the variety of mental abilities needed for intelligence to bear creative fruits. These abilities are a far cry from popular misconceptions about 'genius', namely that genius equals astounding memory, computational ability, or mathematical ability. None of these is critical for creativity, helpful though these may be in certain forms of creativity. The second point is that if any of the abilities in

Figure 11.1 is especially weak, the productivity of creative intelligence may be seriously impeded. For lifelong creativity, exceptional talent in one or two of these abilities may be of less advantage than at least moderate strength in all of them. Moderate strength in the abilities represented in Figure 11.1 can be attained by almost anyone through practice. Thus, lifelong creativity in one or several facets of life is possible for the so-called layperson.

Let us examine each of these abilities in some detail.

#### Sensitivity

The ability to spot the odd, to be sensitive to feelings, textures, sights, smells, sounds—in short, the ability to notice—is highly unevenly distributed. To notice is often to trigger an enquiry, whose ultimate outcome may be a creative insight. Thus, to notice problems, feelings, sensations, anomalies, etc., is a useful creative ability.

Not all problems are stated, or even appear, as problems. If I ask you, as my daughter once asked me, why trees are able to grow back chopped off branches but humans cannot re-grow their chopped off limbs, you know that there is a problem to be solved. The cues are there: the preamble 'why' or 'how'or 'when' or 'what'; and the question mark. But how come the problem occurred to my little daughter and not to me?

Most people are able to spot problems when some puzzle is brought to their notice, or some goal is frustrated, or uncomfortable symptoms manifest themselves. Thus, if I want to go out and my car isn't there or won't start, I know I have a problem. Rarer are the individuals who are able to spot problems because they notice some incongruity or contradiction or incompleteness or paradox in a situation in which others do not notice it. Everybody looks at the sky. But it is the rare mind that wonders why the sky changes colours from season to season. Doctors were familiar with lunacy and abnormal behaviour. But it was Freud who wondered why there is so much method to madness. That people protest bad working or living conditions is a commonplace observation. But why they tend to protest *after* conditions have begun to improve is an incongruity that is less often noticed.

Can the ability to notice incongruities be increased? Perhaps, if one makes one's perception naïve and childlike. It is excessive familiarity with a situation that breeds indifference to the unusual in it. If one could drop the veil of familiarity one could find a world buzzing with riddles. Why does one side of the palm have lines and not the other? Why do we generally look left when we are in a contemplative mood? Why don't we recall most of our dreams on waking up? How come a few minutes of deep sleep is so invigorating after heavy exertion? Why do we have favourite colours? Why are some individuals more accident-prone than others? Why is it that we love children but not childish adults? How come boys' voices change so much in adolescence but not girls? Why are books mainly rectangular and not square or circular or triangular?

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Lifelong Creativity

Interesting Places Are Interesting Viewpoints						
Paris	Uffizi Gallery, Florence	Valley of the Dead, Egypt				
We saw people hurry on their heads to free even legs for gestures	There are mirrors everywhere. You recognize yourself only later.	So many bones so densely packed cling to time like moss.				
Rome	Plaka Market, Athens	An Indian Station				
This is a city of old stones in new flood. But these stones show. They float. • Italian Altercation	In this place every door is a song every song, a window.	The nation was spread on the station. A tide of limbs crested as destiny approached belching and whistling. The full vanished into the full leaving full a prairie of				
I queried him like a crow. He retorted like a babbler. We were both happy we ruffled one another.	Temple at Carnac, Egypt This is one place where God does listen but men turn silent.	bidis*. • * cheap Indian cigars				
(From Pradip N. Khandwalla, Out (New Delhi: Rupa, 1994)						

As important as noticing the anomalous is to be sensorily aware, that is, to be able to notice, and respond to, feelings, textures, sights, sounds, etc. We impair our childhood sensory sensitivity by overspecialized use of our senses, by a tendency to filter out the 'noise' and the 'inessential' in our obsessive quest to achieve our 'important' tasks. But it is in the stream of rejected 'noise' that there may often be exciting anomalies which could, if noticed, trigger chains of divergent thinking. For greater sensory awareness, too, naïve perception is an important first step, to be followed by a regimen for cultivating the senses through hobbies, wider reading, exposure to the arts, etc.

### **Causes and Consequences Guessing Ability**

It is not enough, of course, to sense problems that others do not. It is equally important to make good guesses about their causes and consequences. This after all, differentiates a first-rate mind from a lesser mind. Can this guessing ability be increased? Perhaps, if we understand how good hypotheses get formed.

Often, the first step in being able to guess a cause of an intriguing problem is to restate the problem in more abstract terms. Why does a mother beat a child that she loves so intensely? A more abstract statement of the problem would be: why do humans punish others they are deeply attached to? Once the problem is so stated, it becomes possible to make some guesses.

- 1. Humans may use punishment to modify the behaviour of other humans with whom there is a strong bond.
- Humans may punish other humans with whom they have a strong bond because of the ambivalence this relationship may create. Not all interactions may be pleasant. Thus a mother may beat her child to modify its behaviour despite loving it and/or also because a love-hate relationship may have developed with her child.

Once the problem is restated in an abstract fashion, it may shed light not only on the original problem, but also on why friends and lovers also sometimes hurt one another.

Or take another example. Why is unionism so militant in coal mines? Again, a more abstract statement of the problem may be: why does labour become so cohesive and anti-management in industries like the coal industry? Now, what is so special about the coal industry that may promote worker cohesion and anti-management sentiments? Could it be the isolated location of coal mines, the fact that the coal miners and their families live together in isolated coal mining communities? Could it be the dangerous conditions under which coal miners work, in which one's safety depends very heavily on the concern of one's fellow workers, and management's carelessness can have grave repercussions? Could it be the low level of skills required of the workers, which leads to the hiring of relatively defenceless, easy to exploit workers? Could it be that being isolated, the rapacity of management is not easy to regulate by governmental machinery? Such guesses may not only lead to an understanding of the given problem, but also of other situations, like hostile children in strict boarding schools; alienated managers of the ancillaries of large, powerful companies with greedy, exploitative managements; and indeed, the frequent hostility of the leaders of small or weak nations vis-à-vis the leaders of powerful nations.

The ability to guess consequences of situations that others are unable to requires what may be called a modelling mind. That is to say, it requires a mind that is able to abstract the crucial features of a situation, and the relationship between these features. Armed with a useable map of the situation, the mind is able to make the appropriate deductions, including deductions of what may happen if an element in the problem situation is changed. To build a useful mental model of the situation, the ability to see the situation in somewhat abstract terms comes in handy.

Suppose a young professional, just after graduating from a prestigious management school, opts for a job in a traditionally managed but fast growing pharmaceutical company. He has been hired by the Chief Executive Officer (CEO) to install a management-by-objectives (MBO) system. The senior executives of the company are all old-timers unfamiliar with the tools of professional management. The new entrant persuades the CEO to send a note to the executives in which it is intimated that managerial effectiveness is possible only with an MBO system, that the executives should cooperate with him, and that the installation of such a system will make possible an accurate assessment of executive performance. What is likely to happen?

The crucial features of the situation are that the young executive has some specialized knowledge but no experience, a weak power base, and a mission that may incite a lot of opposition. He has the support of the CEO to be sure, but whether he could retain it if the old-timers formed a hostile coalition to get rid of him is very doubtful–after all the company *has* got along well for many years without a MBO system. Thus conceived, the situation suggests his failure and perhaps a quick exit from the company (or his being sidetracked into an innocuous job)–unless he understands the power structure, makes himself useful to some of the old-timers, gets acceptance, and *then* tries to install an MBO system.

### **Problem Restructuring Ability**

An ability whose importance for creative problem solving was recognized by gestalt psychologists is the one which helps us see problems in a new light.<sup>7</sup> There are many examples of this in the field of management and also in other fields. In the 1930s, some industrial engineers and psychologists were investigating the question of productivity in the Hawthorne plant of the Western Electric Company. They initially thought the problem was one of designing an appropriate physical environment–illumination, space, etc. However, they found that productivity kept on increasing no matter whether they increased illumination or decreased it. The women with whom the researchers were working wanted to oblige them because the researchers had been nice to them. Later, they restructured the problem as one of how to get a group to value high productivity, for their research uncovered the importance of group pressures and norms in shaping the attitudes of members towards their work.<sup>8</sup> Early in the 20<sup>th</sup> century, management experts thought that discovering universal principles of management and applying them to work situations was the main issue in management research.<sup>9</sup> Later research discredited the whole idea of universal

principles, and under an approach called contingency theory, the problem was redefined as one of identifying situation-specific principles of management.<sup>10</sup> For instance, decentralization as a principle of management may be more appropriate in a large, complex organization than in a small, relatively simple organization. Lord Keynes saw the problem of capitalistic economic systems not just as one of explaining why booms and depressions recur in them, but of why depressions persist.<sup>11</sup> In treating illness, 'allopathic' doctors usually think in terms of curing the disease by potent drugs. But naturopaths and homeopaths think of the problem as stimulating the curative powers of the body itself. Such redefinitions of the problem can be extraordinarily productive and have launched revolutions in many fields through what Kuhn has called paradigm shifts.<sup>12</sup>

Research indicates that problem restructuring improves the quality of solutions. Mumford and his associates conceived of the problem structuring task as involving the choice of what information to prefer (among four options), what objective or goal to prefer (among four options), what procedure to adopt (again, out of four options), and what restrictions or constraints to adopt (out of four options).<sup>13</sup> They provided these choices to 124 collegians. As an example, one of the problem situations provided was: "You are the principal of an elementary school. One of the students has brought in a snake, but now it is missing." 'Experts' considered the best quality and original restatement of the problem to be the following.

Determine how dangerous the snake is to see if external help is needed (choice of information); turn this into a learning experience for the students (choice of goal); discretely get a local wildlife biologist to help (choice of procedure); and handle this without anyone getting hurt, including the snake (choice of constraint or restriction).

The lowest quality and originality problem restatement as considered by the "experts" was as follows.

# Find out how the snake escaped (information); keep from being directly held accountable (goal); simply ignore the problem (procedure); and make an announcement without frightening anyone (constraint).

Two 'real-life' problems were given to the subjects, one involving the design of a television commercial for introducing a three-dimensional holographic television in the market; and the second involving dealing with a protest about a company's environment-non-friendly product. Each subject's responses were scored for quality and originality. The results showed modest relationships between the quality and originality of the problem restatements of the subject with the quality of the subject's solutions for the two 'real-life' problems.

What can be done to strengthen the capacity to redefine problems? Several mechanisms are available. Often, we see problems the way we are trained to see them. Thus, a doctor will seek a medical diagnosis of sickness; a psychologist will seek a psychological diagnosis; and a sociologist will seek a sociological diagnosis of the same symptoms. A doctor may achieve a useful

redefinition of the problem by asking himself how a psychologist or a sociologist would interpret the symptoms; the psychologist may achieve it by asking how a doctor or a sociologist would interpret the symptoms; and so on. Thus, putting aside one's disciplinary blinkers for a while and donning other eyepieces may be helpful in seeing the problem from a new angle.

Creative use of deviance may also lead to interesting redefinitions of the problem. There is generally a strong pressure for conformity in a decision-making group, sometimes leading to 'groupthink' and a systematic exclusion of all options that deviate from the group's ideology.<sup>14</sup> Reportedly, during India's Independence struggles Mahatma Gandhi fought this tendency in the Congress Working Committee by deliberately encouraging a highly respected colleague to play the Devil's advocate and raise awkward questions. An internal debate within a group with a powerful protagonist and an equally powerful antagonist can yield a creative redefinition. Bringing together people from different disciplines to look at an issue- an interdisciplinary task force-can also restructure the problem. Data often have the power of restructuring one's perceptions of what the problem is. In one organization that I was associated with as a consultant, the top management thought that the work ethic had declined and therefore the top-level managers had to take on more responsibilities. A survey of the staff revealed that in fact they wanted more responsibilities and their alienation was due to too much centralization. This led to a reversal of the policy of centralizing decision-making authority. Asking the question-"What is the underlying problem of which the current situation is a manifestation?" -may also lead to a useful redefinition of the problem. Many Third World cities are pock-marked by ugly slums. The problem is seen as one of housing the destitutes, many being migrants from the rural areas. But the more interesting question is why do destitutes choose to leave their villages and go to cities where their fate is often worse? Such a question could lead to important sociological, psychological, and economic insights into the slum problem. Finally, a habit of looking for opportunities in problem situations can lead to productive redefinitions. Cities have been stuck with the problem of disposing off vast amounts of garbage. Can garbage be utilized rather than disposed off? Such a question has led to the garbage being seen as potential construction material-through compacting it. Seeing waste as wealth has also led to the conversion of garbage into manure with the help of certain types of bacteria.

People can be trained to get better at restructuring problems more effectively. They can be taught to interpret problems better, make sure they do not miss out on important information, and indeed, identify the information they need to solve the problem (see box on *How to Restructure "Insight" Problems for Solution*).

# Fluency

Fluency, or the ability to ideate copiously, is very useful for responding to that class of problems where it is unlikely that a single best solution exists or can be deduced by strictly logical

operations. Thus, fluency is not much use if the problem is to determine X if  $X^{2-1}6 = 0$ . But it is very useful if, for example, one has to think of ways to teach children how to cross streets, or how to generate extra cash for a cash-starved company, or how to propose to a haughty girl, or how to get rid of the fear of failure, or to come up with alternative titles of a story.

People seem to differ greatly in their fluency. A variation in scores by a factor of three, or even five, in seemingly homogeneous groups of people is not at all uncommon.

### How to Restructure 'Insight' Problems for Solution

Insight problems are frequent in all walks of life. These are problems for which there is a solution, one that can generally be found on the basis of currently available knowledge, but which elude solution because some critical information is overlooked, or the problem is interpreted incorrectly, or some needed information is unavailable or not sought.<sup>15</sup> Once these flaws are rectified, and the problem is thereby redefined or restructured, the solution becomes obvious, and one wonders why it did not strike one earlier.

Insight problems are commonplace in science, and many other walks of life as well. The problem Archimedes faced, when the king asked him to determine whether the crown was made of gold or not or was adulterated, was an insight problem. So was the problem of the structure of DNA that Crick and Watson faced. The litter problem created by empty cups of ice-cream being thrown about on a beach or other public places was also an insight problem (solved by making the wrapping edible, as in a cone). Many management problems are also insight problems. Large corporations tend to be managed by professional managers rather than owners. This creates the so-called agency problem: how can the owners ensure that these managers (who are 'agents' of the owners) pursue the goals of the owners, such as profit/wealth maximization? (By turning managers into owners, of course, through an ESOP or Employee Stock Ownership Plan!) Many trick problems, too, are insight problems. For instance, a coin collector is offered an old coin by a seller, with the head of Alexander the Great on one side and 326 BC stamped on the other. Should he buy the coin? (Of course not!). Or, to take another example, a couple has four sons and each son has a sister. How many members are there in the family? (7)

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People can be trained to restructure insight problems and thereby solve more of them. Pamela Ansburg and Roger Dominowski have developed a way of coaching people to solve insight problems.<sup>16</sup> They found that an untrained group could solve correctly only 35% of the insight problems, while a trained group could solve 60% of these problems.

How was this impressive improvement in performance achieved? First, the trainee group members were given general instructions as to how to go about solving such problems. They were alerted as to why people fail to solve such problems, such as incorrect interpretation of the problem, and missing out on an important detail. Then they were given practice problems. Any error was pointed out, and the experimenter systematically coached the trainee on how to tackle the problem. First, the trainee was asked to read it aloud twice, and paraphrase the problem as the trainee understood it. If the trainee still did not get the solution, a hint was given. If this, too, failed, the coach gave the correct solution and asked the trainee to explain why it was the correct solution. After each problem solving session, the trainee was asked to identify the similarities in the procedures followed for getting at the correct solution vis-à-vis the earlier problems. This sort of practice was given on 15 problems, and only after this practice were the trainees given test problems to solve.

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Let me give an example of the enormous variation in fluency from among students of my creativity class at the Indian Institute of Management, Ahmedabad. Students at this Institute are very carefully selected (annually, about 200 are admitted out of over 30000 applicants), and most of them are 'toppers' at their undergraduate institutions. And yet they vary greatly in their fluency! To the question, "List the uses of cardboard", one of these students mentioned the following two.

- 1. To form interior partitions
- 2. As window panes and ventilators

Another listed the following.

- 1. As a pad for writing
- 2. As an insulator
- 3. As a carpet

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- 4. To draw lines
- 5. To make a cot
- 6. To draw pictures
- 7. To cut into different shapes as in modern art
- 8. To cut into pieces for making a jigsaw puzzle
- 9. To stick paper on
- 10. To make a cylinder
- 11. Use in shoes
- 12. Put in ironed clothes to maintain crease
- 13. Use as a table cover
- 14. Use for shade over head
- 15. Make toy furniture
- 16. Make boxes
- 17. Make hard covers for paperbacks.

Fluency is especially useful when resourcefulness is required. The fluent mind seldom feels paralysed in an unfamiliar situation. Often, it is able to uncover some very good solutions purely on statistical grounds; good solutions are more likely to be found when many ideas are generated rather than when only a few ideas are produced. Norwegian research on students indicates that fluency is higher when one is in a positive mood than when one is grouchy or sad.<sup>17</sup>

Fluency works primarily through the process of associative thinking. One idea leads to another, the second to a third, and so on and on. The best way to increase fluency is to let associative thinking work. The greatest enemy of associative thinking is censorship, either by one's own self or by somebody else. When one is generating alternatives, the desire to exclude 'silly' or 'impractical' alternatives greatly decreases fluency. As Osborn has emphatically said, if you want ideas, and good ideas, postpone evaluation.<sup>18</sup> First pile up ideas, and only when you cannot generate any more ideas should you start sifting them and evaluating them.

If they only heed the principle of deferring evaluation during the idea production phase, people can dramatically increase their fluency. Many trainees are able to double or even triple their fluency within a few days. Fluency is crucial to creativity. Research suggests that those who are fluent also tend to come up with more varied and more original ideas than those who are not.<sup>19</sup> Fortunately, fluency can be greatly increased with practice, and practice situations are likely to be

many. How many breakfast dishes can be made out of flour, milk, and sugar or salt? What are the alternative arrangements of furniture in the living room? What are the alternative routes for getting to work (or to market)? In how many different ways can one begin conversation with one's boss? In how many ways can mathematics be taught to children? How does one make one's child more interested in studies? What hobbies can you share with your spouse and children? How could Sundays and holidays be spent pleasantly? What kinds of friends would you like to have?

### Flexibility

Flexibility in thinking, according to Guilford, means capability for "a change of some kind – a change in the meaning, interpretation, or use of something, a change in the understanding of the task, a change of strategy in doing the task, or a change in direction of thinking, which may mean a new interpretation of the goal."<sup>20</sup> Such a capacity to change implies an ability to respond in many distinctively different ways to situations.

In a wide range of problems it is essential that the problem-solver look at the problem from a variety of viewpoints or angles. If you have to buy a house or choose a spouse or a career, you would need to look at the alternatives from many different viewpoints. Similarly, if you have to deal with an angry neighbour, servant, or customer, you need to look at the problem not only from your point of view but also from his or her, in order to settle the problem amicably. Flexibility is the ability to shift frames of reference, choose a solution bearing in mind multiple criteria, identify various facets of a situation, notice alternative paths to the same goal, and use different approaches for dissimilar problems. There may be different sorts of flexibility. For instance, creativity researchers have distinguished between adaptive flexibility and spontaneous flexibility. Adaptive flexibility is the ability to discard an unworkable approach for a workable one. Spontaneous flexibility is the spontaneous, unforced production of ideas in an open-ended situation in which multiple perspectives or approaches or solutions are possible.<sup>21</sup> It is particularly useful in dealing with people problems, or while making major multi-dimensional choices, or in responding to unstable, ever-shifting tasks.

Consider an intriguing situation. In a plant, accidents have significantly *increased* after a safety department was set up. Why? When I posed this question to some trainees I got varied answers. One person thought that may be now that there was a safety department there was a more accurate count of accidents. Another person wondered whether earlier everybody looked after one another but now that there was a safety department they just discontinued looking out for their colleagues' safety. Or may be the plant capacity and output had substantially gone up, and so it was natural that the number of accidents would go up. Or may be the safety department was staffed by novices who had set up faulty safety procedures. Or may be the plant maintenance had declined at the same time the safety department was set up, and this caused a spurt in machine breakdowns and accidents. Or may be new, inexperienced operators had replaced some old

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hands

### The Semi-circular World
# 12

## Acquiring A Creative Persona



A lthough all of us are different from one another, the creative person is truly and distinctively unique, both because of what s/he does and what s/he is. Note the striking differences in the personalities of some outstanding creators. Emily Dickinson was a shy, home-loving American spinster, who seldom travelled and had very few friends. She wrote 1800 poems of which she published only seven during her lifetime. On the other hand, Herman Melville, her American contemporary and the author of *Moby Dick*, was a born wanderer who traversed the world as a

sailor and spent years with cannibals. The Russian novelist Fyodor Dostoevsky, who penned some of the most awe-inspiring portraits of human agony, was the Czar's guest in Siberia for 10 years for his revolutionary inclinations, and later turned into an inveterate gambler. On the other hand, T.S. Eliot, an American poet who settled in England, was more impeccable than most Englishmen, and was a devout monarchist. Tagore, Munshi, and Karanth, all major Indian literary figures, were versatile geniuses who made significant contributions to different literary forms as well as to education

Man is a born child; his power is the power of growth Rabindranath Tagore

One must have chaos in oneself to be able to give birth to a dancing star Nietzche

and to India's freedom struggle. On the other hand, Premchand, the great Hindi novelist, distinguished himself only as a writer of fiction.

Creative writers do not have the monopoly of being idiosyncratic. Strange streaks illuminate mathematicians and scientists, too. Newton spent much of the later part of his life quarrelling with Leibnitz about who invented calculus first, and in dabbling in the occult. Edison, the discoverer of the electric lamp, the phonograph, the telegraph, and hundreds of other inventions, was something of an enterprising moneymaker even *before* the age of 16. Marie Curie, the Polish discoverer of radium (with her French husband Pierre), was a bit of a political activist in her youth, and later, after the discovery of radium, refused to patent her discovery to exploit it financially, believing that the discovery was for the benefit of the world. Albert Schweitzer, a German doctor and researcher on tropical diseases, earned earlier a doctorate in philosophy, became a preacher, and wrote a major work on the composer Bach. Later he spent his years at Lambaréné in tropical Africa, ministering to the local inhabitants. Bertrand Rusell, another great humanist, was as profligate in his sexual life as he was profound in his mathematics. Ramanujan, the Indian mathematical prodigy, had a passion also for mysticism and astrology.

The case studies of creative persons are fascinating. Abhorred as often as admired, they are vibrant, moody, complex, and seemingly a bundle of contradictions. For instance, in a comparative study of 30 creative Indian musicians and 30 uncreative white collar workers, Manas Raychaudhuri found that the 'creatives' were more emotional but also more independent in judgement; more empathic and wanting intimate relationships but also more paranoid (that is, inclined to view their environment as unfriendly and hostile); more driven by inner needs and more individualistic but also more capable of channelling aggressive energy into constructive, socially acceptable activities; and more exhibitionistic but also more inclined to depression. Compared to the 'uncreatives', they were also more capable of regressing to child-like fantasy states without becoming childish, more involved with their work but also more troubled by conflicts, less conformist, more tolerant of ambiguity and complexity, more inquisitive, more flexible, more determined, and so forth.<sup>1</sup>

This complexity of personality sometimes is a liability to the creative person, or to those associated with him/her, but it may also contribute to his/her creativity. If we can think of different facets of personality as apertures through which the person admits perceptions, ideas, and feelings, then it is obvious that a multifaceted personality, especially one with seemingly contradictory traits, may permit into the consciousness a far richer broth of stimuli than a simpler, more 'uniform' personality. In the tumult of clashing stimuli may well be born those unique syntheses we call creative insights. One of the first steps for becoming more creative may be the acceptance–rather than suppression–of contrary impulses, feelings, and ideas welling in the underworld of the mind. A peep into one's personality–to identify blind spots as well as hidden strengths and motives–may be a necessary first step towards a more creative personality.

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Thereafter, we enquire into the kinds of personality traits, motives, etc. that facilitate creative activity, that is, activity whose outcome is novel, imaginative, perceptive, appropriate, and in its final form, a tranformation of the triggering stimulus.

## **PEEPING INWARDS**

Personality is the set of distinctive characteristics of the individual that he manifests in a variety of situations. Personality is a complex phenomenon. There is, first of all, the personality that is observed by friends and acquaintances. Thus we say that Deepak is sociable and George is withdrawn. Then there is the private personality not known to others. Thus, George may harbour great antipathy to anyone bossing him around, but he may effectively hide this from others. There are also aspects of personality that may be known to others but not to oneself—the so-called blind spots. Often an individual may not be aware of what his acquaintances know, for example, his self-centredness. Finally there is the secret self, unknown to others and to oneself, of deeply camouflaged motives and yearnings, sometimes rooted in traumatic childhood experiences, that can be peeled open after much introspection or psychoanalysis. These four aspects of the personality<sup>2</sup> are shown diagrammatically in Fig. 12.1.

Each of the four segments in Fig. 12.1 provides a different peep into an individual's personality.

#### Fig. 12.1 Four Aspects of the Human Personality

	Known to self	Not known to self (i.e. to conscious mind)
Known to acquaintances	Public personality	Blind spots
Not known to acquaintances	Private personality	Unknown personality or dark area
	•	

The public personality substantially consists of what the individual would like to be known as. The individual may go to great lengths to maintain this public image (an important source of social status), and this may exert a cramping effect on his/her freedom of choice. This is particularly so if there is a striking divergence between the public personality and the private personality. The private personality is often kept private by the individual as a defensive action.

This is true for many traits that may not, according to the individual, be socially acceptable. Revealing them could lead to loss of face. Wanting to keep some traits private also cramps the individual's freedom of choice, for the individual needs to be careful lest he reveals the 'weaknesses' to others.

Blind spots often consist of those traits one finds so repugnant that one represses their knowledge even from oneself. Impulses that collide violently with values cherished by the individual often tend to get repressed. Blind spots are an important source of what to others may seem unauthentic or hypocritical behaviour, due to divergence between intended or consciously desired behaviour and actual behaviour. The unknown personality may sometimes be the repository of unsuspected strengths. These may only be dimly glimpsed, or not at all. Actualizing the potential of this part of personality is a great human adventure. If undertaken, it may bring to the individual the same intensity of triumph as the pioneers probing space or sea beds or the heart of matter or mind.

Generally speaking, the smaller the area of blind spots and unknown personality, the more aware one is of one's deeper impulses and potential, and the more effectively one can marshal one's inner resources to achieve one's goals. If becoming more creative is one's desire, it would be useful to delve into one's blind spots and unknown self to make contact with the deeper forces that are shaping one's life. One should try to strip away the nameless unconscious fears and inhibitions that hold one back from the adventure of a creative life; one should tap the spring of one's deepest yearnings. These would provide a focus to the arena of one's creativity. Equally importantly, they would provide one with a nearly limitless source of energy to pursue the often hard and lonely struggles to innovate successfully.

Secondly, the greater the consistency between the known and the underknown selves of the individual, the better for the individual (in terms of succeeding at difficult, innovative tasks). In others words, the two selves should reinforce each other rather than block each other. Where the two selves are mutually incompatible, the person exhibits schizoid tendencies and the actions are erratic and inconsistent. To bring a greater sense of integration to the self, the person may have to choose between incompatible life goals. For instance, it would be great to have insulation from social criticism and also to be a pioneer. But this is often impossible. One therefore has to choose what one primarily wants–social acceptability or the glory of being a pioneer. At best, having chosen, one can try and reduce the cost of choice by actions that minimize the damage. Thus, if one has chosen the creative path, one must realize that social criticism is likely. One can then try and present one's innovation in a way that reduces opposition.

In the following sections and the next chapter, aspects of personality that are critical to creativity are explored, namely the traits and motives of the creative individual, and the various mental censors that often operate below the level of consciousness to screen out 'dangerous', innovative ideas and alternatives. Figure 12.2 shows the model of the creative personality.



Thus, if we wish to enhance our potential for lifelong creativity, we need to strengthen our creativity-related traits and motives and reduce those fears and disabilities that impede our creativity.

Fig.	12.2	Model	of	Creative	Persona	lity

Core traits related to + creativity	Motivation to create, grow, contribute	-	Fears and disabilities that impede creativity	=	Enduring potential for lifelong creativity
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Readers are exhorted to enlarge their self-awareness by completing the instruments in the appendices to this chapter and the next on one's traits, motives, and blocks. Here, a second opinion should be invaluable. The instruments may also be completed about you by someone who knows you intimately. There will almost certainly be divergences between your perceptions of yourself and the other's perceptions of yourself. These need to be identified for constructive dialogue between yourself and the other, with each sharing information about yourself that has led him or her to views of yourself.

Such an exercise should diminish your blind spots and could also provide some interesting peeps into your dark area. It is through sequences of introspection and interaction that you could gain a lot more insight into yourself, and if you add to these sequences action to change towards being a creative personality, you may well be very pleasantly surprised at the changes you can bring about in yourself in a fairly short time.

## **TRAITS CONGENIAL TO CREATIVITY**

Many psychologists have attempted to identify those personality traits that distinguish creative persons from relatively less creative individuals. The hope is to identify those traits that contribute to creativity. The method by which this is done is to select two groups of individuals, one known to be creative on the basis of some test or criterion, and the other scoring low on a test of creativity, or otherwise judged as not being creative. Thereafter, tests of personality are administered to the two groups. If there is a statistically significant difference on any of the measured personality traits, that trait is presumed to be related to creativity. Obviously, this method has many flaws. For

one thing, there are many abilities related to creativity, such as fluency, flexibility, originality, elaboration ability, problem sensitivity, and so forth, and the findings may be affected by which of these is taken to separate the two samples. Also, from research of this type, it is never clear whether the trait causes creativity or vice versa, or whether the association between creativity and the trait is an artificial one or one arising from mere chance. Nevertheless, taken overall, the findings of psychologists do provide some useful hints as to the traits that are worth inculcating for increasing one's creativity.

In the 1960s, Paul Torrance reviewed over 50 studies of this type, and eventually came up with a list of traits that seemed, on the basis of these studies, to characterize creative indiviudals.<sup>3</sup> A list like this is likely to contain some contradictory traits, and the list prepared by Torrance was no exception. For instance, his list contained contradictory traits like 'quiet' and 'talkative' and 'independent in judgement' and 'willingness to accept judgement of authorities'. It also contained traits like 'timid', 'domineering, and 'negativistic' that are hard to think of as contributing to creativity. Torrance got a panel of 10 judges, all of whom had advanced postgraduate courses in personality theory and all of whom were students of creativity, to rate each of these traits. The top-rated traits may indeed reflect the 'ideal' creative personality.

In the 1950s and 1960s, Don MacKinnon, Frank Barron, and their associates at the IPAR<sup>\*</sup> at the University of California, Berkeley, US, carried out some very interesting comparative studies of creative versus mediocre, 'representative' professionals.<sup>4</sup> The professionals they studied included mathematicians, writers, architects, scientists, etc. The procedure was to get a competent panel to nominate the most creative persons in a profession in North America, who then were invited to spend several days at the Institute during which they were assessed through interviews, projective tests, paper- and pencil-tests, etc. Those professionals who did not show up on the lists of the panel members but otherwise broadly matched the chosen ones in age, experience in profession, etc., were considered 'representative' or mediocre professionals.

There were, to be sure, differences between creative writers, architects, and so forth. But there were also several similarities. What is more, there were also some intriguing differences with the mediocre professionals.

The traits with the strongest consensus in the Torrance list, and the traits that emerged from the IPAR studies as characterizing the creative person, as well as in other studies<sup>5</sup> have been utilized to design an instrument called MY Personality (see Appendix 1 to this chapter). Please complete the instrument and score yourself as per the key provided in Table A12.1 in Appendix 12.1. If possible, get someone else (who knows you intimately) also to rate your traits. Discuss with that person any differences in your ratings, and arrive at a consensus score for each trait (third column

<sup>\*</sup> Institute of Personality Assessment and Research.

in Table A12.1). To convert the consensus score into a percentage score, subtract 1, multiply the result by 20, and put the percentage score in column 4 of Table A12.1 in Appendix 12.1.

Acquiring desirable traits or shedding undesirable ones is difficult, but not impossible. Self-awareness is, of course, the first step. Desire to change is indispensable. Acting as if you already have the desired traits, that is, doing things that are implied by the desired traits, also may help. A good idea is to join an association or organization, many of whose members are creative, or at least make friends with creative persons. Reading about creative persons is another useful option.

## **CREATIVE PERSONALITY AND FORMS OF CREATIVITY**

The creative personality profile discussed earlier is a cluster of basic traits that can service any form of creativity. Beyond these traits, however, the form of creativity attempted would require some additional traits that are needed for that form of creativity.

Consider the differences between essence and elaborative creativities. Essence creativity is highly focused and aimed at the discovery of laws or principles or viewpoints that underlie phenomena. Such a venture requires considerable ability in-and preference for-abstract thinking. It also requires a good deal of rigorous, objective, logical thinking to prove that the new essence one has distilled is fault-free. In pursuing scientific creativity, a further requirement is that what one has discovered is compatible with the rest of the well-proven science. Both these requirements require very rigorous evaluation of one's creation. This is difficult without considerable emotional control. As Arnold Ludwig has pointed out, "Persons in professions that require more logical, objective, and formal forms of expression tend to be more emotionally stable than those in professions that require more intuitive, subjective, and emotional forms."6 Elaborative creativity is more exploratory, and usually involves the effective and novel linking together of various components or modules to create something unique. This requires considerable ability-and preference-for associative thinking. A good deal of flexibility is required to create a multidimensional and novel elaboration. It helps to have wide interests, and ability to see linkages between disparate bodies of knowledge. The elaboration enterprise is not one of seeking the truth but of creating something that elaborates upon some core truths, values, or experiences. Besides, many changes are frequently needed to make an elaboration more effective and distinctive, and this in turn requires a perfectionism that makes one rework one's creation repeatedly.

Expressive creativity, too, requires some distinctive traits: the ability and desire to communicate in a very effective and arresting manner, willingness to work hard at mastering the medium, and a deep understanding of human psychology that facilitates what and how to 'say' to

whom for what effect in what context. It frequently requires high emotional sensitivity and ability to evoke powerful emotions through expression. And, of course, a fine aesthetic sense is needed for making the creative expression also deeply pleasurable even when its theme or message is painful. Although some, like Mozart, are effortless expressive creators, most need to rework their expressive creations repeatedly to bring them to a high level of effectiveness and distinctiveness. And this, as in the case of elaborative creativity, requires a relentless perfectionism.

Entrepreneurial creativity requires some traits that no other form of creativity requires: a combination of lofty vision and driving ambition to innovate and pioneer with extreme pragmatism, managerial excellence, ability to deal with various stakeholders in one's venture, considerable and frequent risk taking, a capacity for cold and objective calculation of costs and benefits of options, ability to execute effectively various decisions and innovations, ability to motivate people through transformational leadership, constant search for opportunities, and the capacity to turn adversities into opportunities.

Existential creativity requires some special traits, too: a strong self-actualization, learning or self-realization drive, transparency and personal integrity, a vision of what it is to be a fine human, constant reflection and introspection on one's thoughts and actions, the ability to create supportive human relationships, willingness to listen to adverse comments for their learning value, and deep respect for the individuality and aspirations of not only oneself but also others.

Empowerment creativity, too, requires some distinctive personality characteristics: a high order of altruism, a deep human empathy and compassion, a vision of humanity's potential, a capacity to suffer many privations in the pursuit of one's ideals, and a capacity to let go once the empowerment job is done and allow people to grow the way they wish to.

## **MOTIVATION AND CREATIVITY**

Motivation exists at various levels. Some needs are very specific, such as the desire to get a particular job or pass a particular examination or the hunger to read or write a particular book. But often these needs are the concrete manifestations of broader and deeper needs, such as the need for financial security or status or personal growth. Psychologists generally try to measure the less specific but more basic needs and motives of people because of the belief that these enduring motives explain not just one particular choice but a whole pattern of choices. Work on motivation has revealed some basic drives like sex, fear, or need to escape; parental protectiveness (need to give succour); curiosity or exploration; appeal for help; self-assertion; narcissism (wish to enjoy self, admire and be admired); and gregariousness.<sup>7</sup> Beyond these, a number of socially influenced motives have been identified, such as the need for self-actualization,<sup>8</sup> for competence,<sup>9</sup> for

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achievement, power, and affiliation,<sup>10</sup> the extension motive,<sup>11</sup> the pioneering-innovating motive,<sup>12</sup> etc.

There has been much speculation on what fuels the prodigious efforts of creative people. One supposition, associated with Freud and his followers, is that a person creates to release or act out his or her inner conflicts and tensions.13 Thus, according to this school, creation is a relief from tension, a sort of indirect catharsis, culminating in the fulfilment of unconscious wishes. Van Gogh, the expressionist painter who ended up committing suicide, is often pointed out as an example. People of this school also believe that conflict-ridden people generally sublimate their inner tensions, that is, express them in works that are socially acceptable, such as paintings or poems. Some have suggested that creators are really narcissists, that is, they create in order to be admired. Isadora Duncan, the flamboyant American

dancer, who streaked naked on a stage, may be an example. While these suppositions suggest some form of mental sickness as a driving force for creativity, there is evidence that creative persons mostly are mentally healthy.<sup>14</sup>

There are other scholars who have argued that people create because of the intrinsic satisfaction they get from the very process of creation.<sup>15</sup> This process, marked as it is by facing challenges and overcoming obstacles, solving technical and/or aesthetic problems, giving birth to something that is one's own, acquisition of new skills and knowledge, and the exhilaration of the moments of inspiration and achievement, is intrinsically so exciting that once someone tastes its sweet and spicy nectar, one is hooked. Money and acclaim, though welcome, become secondary. Thus it was that Munshi Premchand, the great Hindi novelist, could keep writing in the midst of want, noise, and family tensions and the Curies kept searching for radium in spite of poverty, failures, and a dozen inconveniences. Research indicates that creative people have higher aspirations than much less creative people,<sup>16</sup> and this may well be because a powerful intrinsic motivation results in breakthroughs, which in turn raise aspirations about the outcome of creative effort.

Necessity is the mother of inventions, goes the famous adage. All kinds of human needs have led to acts of creation. Marvellously fearsome weapons have been created in response to national feelings of insecurity. Gastronomical delights have been invented to satisfy the cravings of the palate. The drives for money and power have led to vast enterprises and power structures. And of

course, the need to create and to make a distinctive contribution are the springboards of much scientific and artistic creativity. Thus, any human need, when it is felt powerfully enough, can, if the circumstances are favourable, precipitate an act of creation or invention. So does the need to do something creative.

Attempts have been made to measure the need to create. Albert Rothenberg has discussed the motivation to create, that is, to produce something both new and valuable that is characteristic of creative people working in any field.<sup>17</sup> Some scales have been developed specifically to measure creativity motivation. For example, Paul Torrance developed a scale with 28 items called the Creative Motivation Scale.<sup>18</sup> Some of the items were: "I enjoy trying out a hunch just to see what will happen"; "I enjoy tackling a job that I know involves many as yet unknown difficulties"; and "I am inclined to be 'lost to the world' when I get started on a new, original idea". Stephen Joy has developed an instrument that he has called need to be different.<sup>19</sup> It consists of 32 pairs of adjectives, such as creative versus productive; radical versus conforming; misfit versus uninteresting; and ingenious versus sensible. The subject is to choose one of the two alternatives in each pair. When the choices are added up, they indicate the strength of the need to be different. I have developed an instrument for measuring the durable urge of professionals to be creative, as well as five other motives.<sup>20</sup>

There are needs that once satisfied, no longer energize inventive behaviour. Needs for power, security, money, love, etc., are perhaps of this type. On the other hand, there are other needs that provide more durable fuel for creativity. One need is for personal growth, for the development of one's potential, the need to become everything that one is capable of becoming. Abraham Maslow has called this the need for self-actualization.<sup>21</sup> So vast and variegated is human potential and so deeply enjoyable is the experience of growth that the need for self-actualization, once triggered, can be a more or less permanent impulse for personal growth-inducing experiences—what in an earlier chapter we have called existential creativity.

Altruism is the need to contribute to others' growth (what some prefer to call extension motivation).<sup>22</sup> Instead of being concerned only with one's own growth, the altruist is concerned with the growth and development of other people as well, a form of creativity we earlier termed empowerment creativity. This, too, is an unending quest, and therefore an endless potential motivator of innovative behaviour.

Finally, there is the need to create, to discover, to pioneer, to do something original and distinctive.<sup>23</sup> This is the sort of motivation, often in combination with other needs, that keeps creative people going even when the climb is uphill. How else is one to explain the tremendous efforts of creators born in circumstances unfavourable to creativity, such as creators born to farmers, labourers, or petty shopkeepers, notably Walt Whitman, the first great American poet; Rodin, the great French sculptor; Renoir, the impressionist painter; Henry Ford, the inventor of assembly line mass production; H.G. Wells, the historian and writer of science fiction; D.H.

Lawrence, the English novelist; and Sun Yat Sen, the father of the Chinese Republic? How else is one to explain the outpouring of Dostoyevsky's epical creativity after ten years in Siberian concentration camps?

I referred earlier to an instrument I have developed. It measures six different motives of professionals, namely,

- motivation to pioneer and innovate,
- self-actualization motive,
- altruistic motive or conscientiousness,
- financial security motive,
- status or prominence motive, and
- competence motive.

Of these six, the creativity, self-actualization, and altruistic motives power various forms of durable creativity. My study of the motives of 750 professionals was revealing.<sup>24</sup> Compared to a group of lower level staff administrators, selected for their generally low creativity motivation, the creativity motivation of managers averaged 23% higher; of business entrepreneurs, 29% higher; of miscellaneous professionals (engineers, doctors, priests, etc.), 36% higher; and of researchers and scientists, 57% higher. In a later study of some 35 professionals selected on the basis of their innovative work, I found the strength of their creative motivation 75% higher than the base! Another interesting point was that for 750 miscellaneous professionals, there was a positive correlation between creativity and self-actualization motives, but both were negatively correlated with the security and status motives. This meant that the professionals tended to choose between creation and personal growth on one side and safety and status on the other. Some preferred creation and growth; others, safety and status. Although creativity and competence motives were negatively correlated (competence motive measured the desire to do a good job, to be efficient, to reach targets, etc.), both were strong in the sample of 750 professionals. While the competence motive was the strongest among the six motives, the two were very strong and had near parity among the innovative professionals. This drive to do something novel, but do it efficiently, may just be the sort of combination that produces successful innovators. Successful innovators often dream of radical change but with their feet planted firmly on the ground.<sup>25</sup> For a sub-sample of about 140 professionals, the creativity motivation was correlated negatively with mental blocks to creative functioning (described in the next chapter) and positively with fluency, a measure of divergent thinking. Thus, those with a strong creativity motivation tend to be mentally more enterprising than those with a weak creativity motivation.

It is not enough to have a strong urge to be creative, to help others, or to grow as a person. To be able to lead a creative life, it is also necessary to have a *relatively* weak need for security and

status. This is because, beyond a point they distract one from being creative. After all, to be creative means to take risks, go off the beaten track, act in the face of criticism from others, reduce commitments of a social nature, and so forth. Excessive concern for financial or other types of security tends to make these behaviours difficult. Also, the quest for status and power absorbs much energy. If much energy is used up in attaining financial security and/or fending off challenges from others who also want status and power, or wish to displace you, where would be the energy to develop one's potential, or help others, or do something distinctive or creative?

The instrument to measure the six motives and the scoring key are provided in Appendix 12.2. You may like to compare your scores with the average scores of 750 professionals, also provided. Appendix 12.2 also provides a key to interpret your scores, and ways of strengthening motives that lead to one or the other forms of creativity.

The relative scores of your pioneering-innovating, altruistic, and self-actualization motives may provide you with some valuable cues as to the direction your growth should take. Find out which of the three is the strongest. A relatively strong desire to pioneer and innovate should sustain you in such activities as entrepreneurship, art, literature, scientific and technological invention, and theoretical work. A relatively strong altruism implies a strong motivation for empowerment creativity. It should sustain you in attempts to transform people by working with them, understanding their problems, helping them solve them-in short, by becoming a committed social change agent. A strong self-development drive indicates a strong desire for existential creativity. It should sustain you in your struggle for self-actualization, that is, in your growth and development, be it in becoming more open, humane, transparent, ethical, creative, or in pursuing some vocation that is of central interest to you (like music or mountaineering or farming or yoga or spiritual *sadhana* or whatever else that expresses your core).

## **STRATEGIES FOR CHANGING MOTIVATION**

A person's motivation is a result of many forces. Genetic inheritance is one such force. Upbringing is another major force, as are education, friendships, job, etc. These are powerful forces, and so, it is not very easy to change one's motives. And yet, within limits, an awareness of the forces shaping one's motives can help one strengthen desired motives and weaken undesired ones, at least over a period of time.

Consider the need for security and the need to be creative. How does one weaken the former and strengthen the latter? Remember, motivation is not merely a wish to do this or that, but a living force that impels one to act in some particular way. The following broad steps may be useful.

#### Awareness

Awareness initiates action. It is necessary to know the strength of the current security motivation and the current desire to be creative, as also the desired changes in these. But awareness is not a mere abstract number like 50% or 60%. It involves an exploration into one's self of the roots of these motives, what forces have shaped them, the forces that are preventing change in them, manifestations of these motives in one's behaviour, and the consequences of these motives. One needs to review one's childhood, the encouragement or discouragement to certain patterns of behaviour provided by one's elders, teachers, or playmates. One needs to identify the forces in one's job, home, and social situations that strengthen or weaken one's security and creativity motivations. One needs to examine one's choices of career, spouse, job, friends, lifestyle, hobbies, etc. to see what these reveal about one's motivation. One needs to see oneself in action at one's job and in interactions with one's spouse, children, friends, subordinates, etc. Does one encourage others to innovate, experiment, be resourceful, and show initiative? Or is one more frequently cautioning others, discouraging experimentation, showing apprehension or dislike for inventions? Out of this introspection should come a greater awareness of one's true motivation.

#### **Desired Change**

With awareness comes the need to do something about the status quo. If the desire is to reduce security motivation and the fearfulness and defensiveness that go with it, and to increase creativity motivation and the risk taking and experimental attitudes that go with it, one needs to think of *specific aspects* of life where change is needed. For example, one has to think of how one will become more venturesome or creative in food habits, dress, and the kinds of friends one invites home; the kind of signals one gives to one's spouse, children, subordinates; the way one functions in one's job; etc.

#### **Role Model**

Often, when one is contemplating a major change in one's lifestyle, it is useful to identify a person who was earlier very much like oneself but by an effort of will has changed in the direction one wishes to go. There are many such lives to draw upon for inspiration.<sup>26</sup> Mahatma Gandhi was so fearful that at his first case he failed to plead, and as he himself put it picturesquely, his heart sank into his boots. And yet, later on he became a peerless rejuvenator of Indian society, leading Indians not only to political freedom but also towards emancipation from casteism and communalism and from domination of females by males, freedom from illiteracy, inferiority complex, and foreign dependence. Till the last he remained an experimenter—one of those rare individuals who practised before he preached. Henry Ford was a school dropout yet his invention of assembly line production had a revolutionary impact on the industrialization of the US.

In this connection, the role of expectations is worth mentioning. Research has indicated that the expectations of somebody one has trust and faith in about one's performance can powerfully motivate one's behaviour in the direction of his/her expectaions.<sup>27</sup> Having a guru or mentor who embodies one's ideals and who is somewhat demanding can, therefore, be quite helpful in changing oneself.

#### Action

Generally we think that action follows motivation. Research has shown that the reverse is also true-that behaviour moulds attitudes.<sup>28</sup> Thus, if you *act* creative you might develop an interest in creativity. Doing something different opens new vistas and leads to a reassessment of one's abilities. What we all call self-confidence is nothing but a positive assessment of our abilities following the doing of something in which we earlier feared failure. It would be useful to list a number of acts that signify creative or non-defensive behaviour. These need not be heroic. They can be as trivial as tasting five new dishes in the next week or leafing through two magazines you have never read before or going to work by a path you have never taken before or rearranging your room or desk or office in a new way. The point is that these small acts must be *done*. The successful execution of these challenges will open up numerous other possibilities and before long what was done in a forced and self-conscious way will come naturally–you will love to live in a creative way!

#### Reinforcement

As behavioural research has repeatedly demonstrated, rewards strongly consolidate the behaviour that is rewarded.<sup>29</sup> Reward can be extrinsic or intrinsic. When somebody praises you or gives you a promotion or increment for a job well done, it is an extrinsic reward. When you feel a sense of delight in the very doing of a job, the reward is intrinsic. An encouraging spouse, friend, colleague, or boss may be an important source of extrinsic reward to your efforts at changing your behaviour. Succeeding, by taking on moderate challenges at innovation, and working hard at accomplishing the tasks implied by them, is an important source of intrinsic satisfaction. For those who like acronyms as mnemonics, the foregoing strategies for changing motivation provide an easy one to remember–ADRAR.

## **CONCLUDING COMMENTS**

Human beings resemble chameleons-they change their persona depending upon the situation. But this is superficial, temporary change. Lifelong creativity requires more fundamental changes,

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in traits as well as motives. Such changes are possible with imagination and determination, and help from mentors. Children are especially good role models. To be creative one does not need to turn infantile or childish, but simply to recapture the child's boundless curiosity and enthusiasm for fun-filled experimentation. The result would be not just exhilarations galore but adult contributions that in small ways and big, make living for all of us more wondrous.

Alexander Calder, a noted American sculptor, provides a good example of this capacity for being stimulated into fresh initiatives.<sup>30</sup> Initially a mechanical engineer, drafting work in an engineer's office spurred his interest in drawing. Later he began to do illustrations for a journal, and while covering a circus he delightedly sketched the animals. He then published a book called *Animal Sketching*. Later he went to Paris and began to make a number of animated toys with materials like spools, corks, and twisted wire. He could make them perform astonishingly life-like acrobatic tricks and he became famous in Paris for these. At the suggestion of a friend, he started making figures wholly out of wire and he became skilled at suggesting three-dimensional form through the skilful manipulation of wires. A chance visit to the painter Mondrian gave him the idea of making mobiles, circles, and rectangles that moved in patterns from a base attached to a wall. Although initially these were moved by electrical or manual means, later, taking a cue from Chinese wind bells, he began to suspend objects that moved by the wind into endlessly changing dynamic forms.

Kota Shivram Karanth, winner of the Jnanpith Award, one of India's premier literary awards, offers another example of the capacity for creative stimulation that is the hallmark of the creative personality.<sup>31</sup> Born in a village into an orthodox South Indian Brahmin family of modest means, Karanth managed to get to college, but soon left it to plunge into India's freedom struggle. Later he began to learn classical music. But his music teacher came from a community where the tradition was to give away girls to the wealthy for monetary consideration. He plunged into a reform of this system, roaming the countryside and locating bridegrooms for such girls. Next, he turned to literature and started a Kannada journal which, however, folded up after a three-year struggle to keep it afloat. In the meanwhile, he got involved in itinerant drama groups and tried his hand at writing, acting, and directing, the idea being to use drama as a vehicle for social reform. He also went on a pilgrimage to several places associated with India's history and culture. Next he got interested in children's education and organized summer camps for children where the emphasis was on physical exercise, social service, and social and cultural awareness. He also wrote books for children, composed operas and wrote musical dramas, and authored satires, essays, stories, and novels. In the midst of all these activities he learnt - and taught - classical dance, revived a folk art, and produced films! Karanth's is a fine example of expressive, elaborative, entrepreneurial, existential, and empowering creativities-all rolled into one multifaceted persona.

Of course Calder and Karanth were talented. But they could not have been so creative without an assimilative and resilient personality that exuberantly responded to each stimulus with the fresh seriousness of a child.

OUIZ

In the next chapter we take a look at those mental blocks that impede our creativity.

1	Olympic champions must have high scores on creativity-related traits
1.	
2.	Workers and housewives cannot be creative.
3.	Jesus and Buddha were more creative than Einstein.
4.	All scientists are motivated by a desire to pioneer.
5.	If you take creativity traits seriously, you would end up in a lunatic asylum.

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## **MENTAL GYM**

#### **Bigger Beliefs**

There are some widely prevalent beliefs that freeze innovation, originality, and enterprise. Often, the beliefs are based on a grain of truth, and hence they sound quite plausible. But they are harmful because they become crutches of passivity, or because they are overgeneralized, beyond the specific situations in which they may be valid. Consider this belief: "One must have perfect control over one's feelings." The belief is plausible. After all, doesn't the Geeta say that loss of control over feelings like kama (sexual arousal), krodha (anger, irritation), attachment, etc. leads to disaster? And yet, what would life be worth if we could not express feelings freely and spontaneously towards the people and things we love? Would we not be prey to neurosis and psychosomatic illnesses if we bottle up our feelings and repress them? Clearly, we need to replace a belief that does much harm by one that does much good. For example, we could replace the belief "one must have perfect control over one's feelings" by the belief "we must experience our feelings richly and express them constructively." It is better to feel the anger one feels towards one's child, spouse, boss, or subordinate than to suppress it; and instead of blowing up or muttering obscenities, it is better to give accurate and detailed feedback of one's feelings and what caused them to the person one is angry with, so that he or she can adapt more effectively to our feelings in the future.

Listed below are a few common beliefs. See if you can come up with alternative, more constructive beliefs.

It may be helpful first to find out what is right with the belief, then find out what is wrong with it, and then try to come up with a belief that retains the strengths and avoids the weakness of the belief. Take 5 minutes per item. It would be better if you can do this exercise in a small group, and share your perceptions of what is right and wrong with each belief and *your* alternative belief.

#### Write Alternative Constructive Beliefs for each of the following:

- 1. I must strive to be perfect in everything I do.
- 2. There is something very wrong if I am not considered 'successful'

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- 3. Only fools rush in where angels fear to tread.
- 4. One must behave with propriety in every situation.
- 5. One must fulfil one's family obligations at any cost.
- 6. Necessities must always have priorities over aesthetic matters.

## APPENDIX 12.1

Time: 15 minutes

Name:

Date:

#### **My Personality**

Given below are a number of scales. For each scale, there are 6 points. You have to circle only *one* number in each scale. If you agree very strongly with the statement to the *left* of the scale, circle 1; if you agree with it strongly, circle 2; if you agree moderately, circle 3; if you agree very strongly with the statement to the *right* of the scale, circle 6; if you agree with it strongly, circle 5; if you agree moderately, circle 4; if you agree moderately, circle 5. Remember only *one* number is to be circled in each scale.

1.	I do not have an unhealthy curiosity and I don't like to show my ignorance by asking questions.	123456	My curiosity is insatiable; I want to know about everything and I am constantly asking questions.
2.	I find subjects like philosophy quite boring.	123456	I have a strong interest in stimulating ideas, theories, and philosophies.
3.	Who cares about the 'why' of things? I am only interested in the 'how' of things that I have to do.	123456	I am always trying to find out the 'why' of things.
4.	I do not like to poke my nose into others affairs.	123456	I am very interested in studying people and their motives and behaviour.
5.	I really enjoy food, clothing, 'action' films or competitive sports more than anything else.	123456	I enjoy most many of the delicate and fine things of life, such as literature, music, art, flowers, interior decoration, etc.

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6.	I feel quite uncomfortable without company.	123456	I don't usually crave for company but I enjoy meeting interesting and sensitive people.
7.	One can't care for every one. I care mainly for my family members and friends.	123456	I am often touched deeply by the misery of strangers.
8.	I am primarily interested in the usefulness of things.	123456	Beauty and elegance of things move me even more deeply than their usefulness.
9.	I tend to solve problems by systematic, step-by-step logic and analysis.	123456	I tend to skip steps and leap intuitively to correct solutions.
10.	I don't waste time in visions and dreams; I believe in being down to earth.	123456	I often have visions about the kind of society we should have, the kind of work people should be doing, my own role, etc.
11.	I am a solid person and hold only very respectable ideas.	123456	Some people think I am crazy because my ideas are so strange.
12.	I have a pretty balanced temperament.	123456	I am a moody person and I have my highs and lows, elations and depressions.
13.	I tend to be rather cautious in risky situations.	123456	I love to take calculated risks.
14.	I prefer to work on ventures or projects led by solid, dependable persons.	123456	I prefer to start ventures and projects of my own.
15.	I am a realist; I pursue only those goals I can attain soon and successfully.	123456	I know I may never reach some of my goals but I still pursue them.
16.	I like to go along with others.	123456	I rather like striking out on my own.

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17.	I seldom ever question whatever is well-established.	123456	I do have a strong tendency to question the established order of things.
18.	I don't really stick rigidly to any core convictions or values.	123456	I stick to a few core convictions and values, come what may.
19.	One can't know everything; I mostly rely on experts' opinions.	123456	I may hear out what an expert has to say but I make up my own mind and have my own ideas.
20.	There is much virtue in being cautious when it comes to expressing one's views and feelings.	123456	I make no bones about where I stand; I assert my viewpoint and feelings clearly and forcefully.
21.	It is upto my superiors to tell me the restrictions within which I have to work.	123456	I take the initiative to identify clearly the restrictions within which I am expected to work.
22.	I feel pretty upset in crisis situations and this badly affects my functioning.	123456	I feel pretty confident that I can manage any crisis.
23.	I have a hard time coping with change of any sort.	123456	I can adjust very quickly to new challenges, problems, and information.
24.	I hate to live in a world of fantasies and wishful thinking.	123456	I really enjoy having fantasies but I don't lose my grip over reality.
25.	I do not shirk work but it certainly is not my whole life.	123456	I get wholly preoccupied with challenging tasks.
26.	There is always so much one doesn't know; I often feel quite diffident in unfamiliar situations.	123456	I am quite confident of my abilities even in unfamiliar situations.
27.	I know my limitations–I take on only those tasks I can achieve comfortably.	123456	I have a tendency to take on really difficult tasks most would avoid.

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28.	I tend to avoid ventures that demand too much commitment of my time and energy.	123456	I tend to persist in my ventures to the point that others think I am obsessed.
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Scoring key: For each scale, rating of 1=0%; 2=20%; 3=40%; 4=60%; 5=80%; 6=100% After rating the scales in the table above, transfer the percentage scores on the table below.

 TABLE A12.1
 Creative Personality Score

	Self-rating	Other's rating	Consensus Score
	% score	% score	% score
Hunger for knowing			
1. Curiosity, constantly asking questions (scale 1)			
2. Intellectual interests (scale 2)			
3. Interest in causes of things (scale 3)			
4. Psychological orientation (interest in behaviour) (scale 4)			
A. AVERAGE FOR ITEMS 1, 2, 3, 4			
Sensitivity	1		
5. Responsiveness to fine and delicate things (scale 5)			
6. Enjoyment of interesting people (scale 6)			
7. Emotional sensitivity (scale 7)			
8. Aesthetic sensitivity (scale 8)			
B. AVERAGE FOR ITEMS 5, 6, 7, 8			
Complexity			
9. Intuitive ability (scale 9)			
10. Visionary (scale 10)			
11. Unusual ideas (scale 11)			
12. Moodiness (scale 12)			
C. AVERAGE FOR ITEMS 9, 10, 11, 12			
Venturing	C4		
13. Calculated risk taking (scale 13)			

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#### TABLE AI2.I ↓

	Self-rating	Other's rating	Consensus Score
	% score	% score	% score
14. Starting own ventures (scale 14)			
15. Striving for big goals (scale 15)			
16. Striking out on own (scale 16)			
D. AVERAGE FOR ITEMS 13, 14,15,16			
Independence and Courage			
17. Questions established order (scale 17)			
18. Courage of convictions (scale 18)			
19. Independence of judgement (scale 19)			
20. Frankness and assertiveness (scale 20)			
E. AVERAGE FOR ITEMS 17, 18, 19, 20			
Reality Contact			
21. Constraints seeking initiative (scale 21)			
22. Crisis management (scale 22)			
23. Flexibility, adjustability (scale 23)			
24. Fantasying without reality loss (scale 24)			
F. AVERAGE FOR ITEMS 21, 22, 23, 24			
Self-sufficiency			
25. Preoccupation with challenging tasks (scale 25)			
26. Confidence in own abilities (scale 26)			
27. Attempting difficult tasks (scale 27)			
28. Persistence (scale 28)			
G. AVERAGE FOR ITEMS 25, 26, 27, 28			
AVERAGE FOR SCORES A TO G			

## **Strategy for Needed Changes in Personality**

Having scored yourself on your personality, now identify the traits in which your score falls below 60%. You need to pay particular attention to these traits. Write down below the traits in which

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your score is below 60% (if you have more than five such traits, write down the five traits with the lowest scores):

Weak traits 1.	
2.	
3.	
4.	
5.	

Now, for each trait, identify a person you believe is strong in that trait. How does this person function? Can you learn something from this person?

#### Role models for each weak trait

1.
 2.
 3.
 4.
 5.

Now think of one action you can take assuming that you are in fact strong in the trait.

## Action

Trait 1

Trait 2
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Trait 3

Trait 4

Trait 5

Perform! Do the actions. Learn from your experience, and try out more actions.

## **APPENDIX 12.2**

## Assessment of Motivation

Complete the instrument *My Preferences* given below. After completing it, use the scoring key (provided later) to assess the strength of various motives, and interpret them with the help of the note on interpretation (also provided later).

Name:

Time: 20 minutes

Date:

#### **My Preferences**

Given below are a number of situations, and 6 alternatives in each situation. How would you respond in each situation if you had to choose only from amongst the given alternatives.

In *each situation*, you have *30 points to allocate* between the six alternatives. Consider each alternative carefully, and bearing in mind the other given alternatives, give it the points that reflects its priority *to you*. You should allocate points to the alternatives subject to the following *rules*.

- 1. The points must *sum to 30*.
- 2. No alternative should get the some points as any other alternative. In other words, *no ties*.
- 3. The *maximum* points you can give an alternative is 15; the *minimum* is 1.
- 4. *No decimals* are permitted.

Please put down your *points* for each alternative in the *space* provided to the *right* of the *alternative*. After you have put down the points for all the alternatives in a situation, *total* them up and make sure that they sum to 30.

For each question, first read through all the alternatives. Next, identify the ones that appeal to you the most, and give them the appropriate points. Finally, give appropriate points to the remaining alternatives.

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-		0
Firs	at try out this practice item	Points
On	a holiday, my <i>priority</i> is	
a.	To complete my pending tasks <i>efficiently</i> , even if that leaves <i>little time</i> for entertainment or relaxation	
b.	To <i>meet people</i> who can help <i>me</i> become more prominent, even if <i>family members feel</i> I am <i>neglecting</i> them	
c.	To learn or do something off-beat, even if people crack jokes about it	
d.	To discharge <i>home-related duties conscientiously</i> , even if this <i>leaves little time for fun</i> and games	
e.	To read books or do things that <i>expand my awareness</i> of myself and the world, even if <i>friends</i> call me <i>anti-social</i>	
f.	To study investment alternatives, job opportunities, etc. for increasing my <i>financial security</i> , even by forgoing <i>related activities</i> like going to movies, meeting friends, etc.	
	Total (Please check)	30
	After completing it, please review the points you have allotted and make sure that all the rules have been followed. Now you are ready to take the test.	
1.	My main aim in life is	
a.	To be <i>financially secure</i> , even if I have to forgo opportunities for <i>jobs</i> involving <i>exciting tasks</i> but risky returns	
b.	To <i>perform outstandingly</i> in my chosen <i>field</i> , even at the cost of <i>neglecting</i> close personal <i>relationships</i>	
c.	To secure a <i>high position</i> despite the <i>compromises</i> with my <i>principles</i> this may require	
d.	To do something <i>unique and distinctive</i> , even if <i>people</i> initially <i>laugh</i> at my efforts or <i>criticize</i> them as <i>impractical</i>	
e.	To <i>fulfil</i> all my family and social <i>obligations</i> , even at the <i>sacrifice</i> of my <i>comforts</i>	

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f.	To <i>develop</i> fully all <i>my potentialities</i> , even if this means <i>going against the norms</i> of <i>people</i> I have to <i>live with</i>	
	Total (Please check)	30
2.	At work I would very much like to	
a.	Be the person who takes jobs with the <i>maximum learning value</i> , even if these jobs are <i>not</i> very <i>prestigious</i>	
b.	Be in a secure and well paying job, even if my work is uninteresting	
c.	Be an <i>efficient</i> person who consistently <i>performs well</i> despite <i>colleagues</i> branding me a <i>workaholic</i>	
d.	Be a person of <i>great authority</i> , even if this earns me the <i>enmity</i> of jealous rivals	
e.	Be the person with <i>original ideas</i> and solutions, <i>even if colleagues</i> think of me as a <i>crackpot</i>	
f.	Work <i>conscientiously</i> for the <i>good</i> of the <i>organization</i> , even if this <i>overburdens</i> me	
	Total(Please check)	30
3.	At home I greatly <i>prefer</i> to	
a.	Serve the elders and nurture the youngsters, even if I have to sacrifice my own comforts and convenience	
b.	Do my own thing, despite accusations of being self-centred	
c.	Live <i>within</i> my <i>means</i> and save for the rainy day, even if this means a rather <i>simple</i> style of <i>living</i>	
d.	<i>Work</i> hard at improving <i>household practices</i> despite <i>resistance</i> from family members	
e.	Be the person of <i>final authority</i> , even if <i>distance</i> thereby creeps into my <i>relations</i> with family membes	
f.	<i>Experiment</i> with <i>new ideas</i> and <i>innovations</i> , even if family members <i>taunt</i> me for being <i>impractical</i>	
	Total (Please check)	30
4.	I prefer a <i>career</i>	

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a.	That lets me leave my mark in my field for a <i>unique achievement</i> despite <i>failures</i> and <i>disappointments</i>	
b.	In which I can <i>serve society</i> with devotion, even if it means many <i>material sacrifices</i>	
c.	That lets me develop my innate talents, even if this means lower earnings	
d.	That gives me <i>financial security</i> , even if the <i>work</i> is <i>not</i> very <i>exciting</i>	
e.	In which I can be a <i>top performer</i> , even if this requires <i>exhausting work</i>	
f.	In which I reach a <i>high position</i> , even if this means bitter <i>fights</i> with <i>rivals</i>	
	Total (Please check)	30
5.	I am strongly drawn to persons who are	
a.	Highly placed, even if somewhat formal and stern	
b.	Innovators, even if they are odd or reserved	
c.	Very <i>conscientious</i> with respect to their duties and <i>social obligations</i> , even if inclined to preach morals	
d.	Constantly <i>enlarging their skills and awareness</i> through <i>new experiences</i> , even if somewhat <i>self-centred</i>	
e.	Well-to-do, even if otherwise quite ordinary	
f.	Great achievers, even if excessively work-centred	
_	Total (Please check)	30
6.	Among the following I prefer to read accounts of	
a.	Persons who rose from rags by dint of sheer <i>competence and hard work</i> , even if their <i>family life</i> suffered in the process	
b.	Persons who came to wield <i>great authority</i> and achieved great <i>prominence</i> , even if they died <i>lonely</i> and <i>unloved</i>	
c.	Persons who blazed <i>new trails</i> , even if they <i>came to grief</i> at the hands of vested interests	
d.	Persons who served society with great dedication, even if they died paupers	
e.	Persons who <i>lived</i> every moment <i>to the full</i> , even if they were <i>hounded</i> for <i>breaking social taboos</i>	

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f.	Persons who were <i>prudent and solid</i> citizens, and <i>avoided</i> most of the <i>misfortunes of life</i> , even if they <i>never experienced</i> the thrill of <i>adventure</i>	
	Total (Please check)	30
7.	If I win \$ 100000 in an international lottery, I would	
a.	Invest in very safe government securities to earn interest	
b.	Spend on a course of study or <i>training</i> at the world's <i>best facility</i> that can greatly <i>increase</i> my level of <i>competence</i> in my <i>area of work</i>	
c.	Become a member in a highly <i>exclusive club</i> where I can meet very <i>important people</i> at a <i>social level</i>	
d.	Spend on research or other efforts that could lead to a <i>pioneering</i> breakthrough in a problem area of my interest	
e.	Spend on the higher education of bright but poor students	
f.	Get <i>training</i> from a <i>great teacher</i> in an art or craft or vocation	
	Total (Please check)	30
8.	Whenever I am faced with a <i>tough task</i> , I <i>prefer</i> to	
a.	Adopt the method with the <i>greatest learning</i> value for me, even if it <i>differs</i> from the method <i>recommended</i> by <i>experts</i>	
b.	Follow a <i>time-tested</i> , <i>economical</i> , and <i>safe</i> way of accomplishing it, even if it is <i>tedious</i> and time consuming	
c.	Do a better job than anyone else, even if it leaves very little time for anything or anyone else	
d.	Follow a method that will get me the most <i>credit</i> and <i>recognition</i> , even if I have to <i>cut</i> some <i>corners</i>	
e.	Look for <i>novel and off-beat</i> ways of accomplishing the task, even if others think I am <i>crazy</i>	
f.	Follow the method in the <i>best interests of everyone</i> concerned, even if it means some <i>sacrifice</i> of my <i>own interests</i>	

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	Total (Please check)	30
9.	One of my greatest <i>ambitions</i> for my <i>child</i> (present or prospective) is that the child should grow up to	
a.	Serve society and family with great devotion to duty, even if this means going <i>without</i> the <i>luxuries</i> of life	
b.	Follow a path of maximum <i>self-development</i> and <i>self-fulfillment</i> , even if this means <i>breaking</i> social <i>conventions</i>	
c.	Be financially very secure, even at the cost of sacrificing exciting careers	
d.	Acquire great competence and expertise in his or her vocation, even if it takes many sacrifices to acquire it	
e.	Be a person of <i>high status and authority</i> , even if the price is unpopularity with some people	
f.	Be a <i>pioneer and path-breaker</i> , even if he or she has to suffer many <i>frustrations, failures, and criticisms</i>	
		30
10.	I prefer a <i>spouse</i> who is	
a.	Quite original and gifted, even if somewhat moody and unpredictable	
b.	Very <i>obliging</i> and <i>helpful</i> , even to the point of being considered <i>gullible</i> by some <i>people</i>	
c.	Strongly inclined to <i>develop</i> his/her <i>talents</i> , even if this means some <i>neglect</i> of <i>family duties</i>	
d.	Rich, even if somewhat ordinary	
e.	Highly achievement-oriented, even if somewhat aggressively so	
f.	From a prestigious family, even if somewhat snobbish	
	Total (Please check)	30

## Scoring key

Your preference measures the strength of 6 competing motives, namely, safety motive, achievement/competence motive, status/power/prominence motive, pioneering and innovating motive, altruistic/conscientiousness motive, and self-actualization motive. To compute the %

score for each motive, fill up the following table by transferring the points you have given to each alternative in each of the 10 situations as shown below.

Safety motive	Competence motive	Status motive	Pioneering–Innova ting motive	Altruistic motive	Self-actualization motive
Points assigned in	Points assigned in	Points assigned in	Points assigned in	Points assigned in	Points assigned in
1 a	1 b	1 c	1 d	1 e	1 f
2 b	2 c	2 d	2 e	2 f	2 a
3 c	3 d	3 e	3 f	За	3 b
4 d	4 e	4 f	4 a	4 b	4 c
5 e	5 f	5 a	5 b	5 c	5 d
6 f	6 a	6 b	6 c	6 d	6 e
7 a	7 b	7 c	7 d	7 e	7 f
8 b	8 c	8 d	8 e	8 f	8 a
9 c	9 d	9 e	9 f	9 a	9 b
10 d	10 e	10 f	10 a	10 b	10 c
Sum					
Subtract 10	Subtract 10	Subtract 10	Subtract 10	Subtract 10	Subtract 10
Resultant					
Divide					
Resultant by 3					
Your score for the					
motive					
%	%	%	%	%	0/

## Comparison

Given below for comparison are the averaged scores of 750 Indian professionals.

Acquiring A Creative Persona

		% Score
1.	Safety motive	14%
2.	Competence motive	20%
3.	Status motive	10%
4.	Pioneering–Innovating motive	19%
5.	Altruistic motivate	18%
6.	Self-actualization motive	19%
	Total	100%

#### Interpretation

- a. Summing your scores for pioneering-innovating, altruistic, and self-actualization motives may give you a good picture of your (current) motivation for lifelong creativity. An even more accurate estimate would be to subtract from this the scores for the safety and status motives. The comparison group of 750 Indian professionals averaged 32% on this *net motivation for lifetime creativity*. If your score is below this number, and if you aspire to lifelong creativity, then you need to take active steps to review your motives, strengthen the three motives that contribute to lifetime creativity and weaken the two motives that especially impede lifelong creativity, namely the safety and status motives.
- b. Look at the relative strengths of your pioneering-innovating, altruistic, and self-actualization motives. Is there a clearly dominant motive amongst these three? If it is pioneering-innovating, your motivation is likely to facilitate one or more of essence, elaborative, expressive, or entrepreneurial creativities. If it is altruistic motive, it is likely to facilitate empowerment creativity. If it is self-actualization motive, it is likely to facilitate existential creativity. A reasonably high score on competence motive will facilitate any of the creativity forms you choose.

## Personal Strategy for Changing Motivation

- 1. Which of your motives needs strengthening? Why?
- 2. Which of your motives needs weakening? Why?

- 3. What circumstances, fears, habits, and other forces are currently weakening the motives that needs strengthening? Identify the forces within you as well as outside you that are depressing these motives.
- 4. What forces within you and outside you are resisting the weakening of the motives that need to be weakened?
- 5. List ways for increasing the strength of the desired motive(s). Do not be inhibited by considerations of practicality or propriety. In other words, think of even highly unconventional or even 'crazy' ways. Brainstorm! Consider new activities, role models, hobbies, friends, medicines, training, etc.
- 6. Pick the best five ideas from the ideas you generated in 5 above. You may, if you like, consult a friend or a teacher or a relative. Pick the ideas that may have the greatest pay-off for the effort involved.
- 7. Brainstorm on ways of *decreasing* the strength of the *undesirable motives*.
- 8. Pick the best five ideas from the ideas you generated in 7 above. Take help if you like. Pick the ideas that may have the greatest pay-off for the effort involved.
- 9. Pick two or three of the most promising ways of changing your motivation and develop a fairly detailed, time-bound plan for implementing them. For example, what do you plan to do this week, this month, this year? What resources in money, friends' support, time, and space can you commit to your efforts? How will you evaluate your progress?



10. Consider measuring your motives periodically with the help of the instrument *My Preferences.* Chart your net creativity motivation (pioneering-innovating + self-actualization + altruism – financial safety – status).



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## Weakening Our Inner Sensors



## **BLOCKS TO CREATIVITY**

Research suggests that the creative personality is characterized by spontaneity, curiosity, love of complexity, playfulness, and so forth.<sup>1</sup> But many fears and disabilities may block a person from exhibiting these characteristics. While creativity related motives impel a person to do something different, these partly unconscious blocks tend to prevent a person from acting or thinking in creative or unconventional ways.

Complete the instrument *My Temperament* provided in Appendix 13.3. This instrument is intended to give you some idea of the blocks that may be operating within you. So complete it as honestly as you can. The scoring key is given below the instrument.

Some common blocks<sup>2</sup> to divergent thinking and creative functioning are as follows.

Fear to let fall a drop and you spill a bucket Malay proverb Fear has the largest eyes of all

Boris Pasternak

## Fear of Failure

From our childhood, success is usually rewarded and failure is punished, so some of us develop an exaggerated fear of failure. Such individuals are likely to avoid competitive situations, i.e., situations in which they are likely to be compared to others. Many of us surely remember the lump in our throat and the cold shiver in our feet when making a public speech for the first time, or at the time of our first interview. A strong fear of failure makes us avoid risks. At times, it makes us take excessive risks to have an alibi for failure. Although



some fear of failure is useful in mobilizing us for a task, excessive fear of failure prevents us from acting at our best. In a study of about 150 American school children, Michael Wallach and Nathan Kogan noted that those they identified as creative but not very intelligent had higher fear of evaluation than those they identified as either highly intelligent but not very creative, or highly creative and intelligent, or relatively low in both intelligence and creativity.<sup>3</sup> As a result the creativity of the high creativity and moderate intelligence children suffered in test situations. This higher fear of evaluation may well have been because, in the past the unconventional way of responding to tests may be have earned them low grades from teachers looking for standard 'right' answers.

The acceptance of failure as necessary part of life is the best way to get rid of this block. No child would learn to walk if it was excessively afraid of falling. Failure is as necessary as success in learning new skills. Failure simply means that we have to try harder, or that we have to take a new approach. It does not mean that we are no good. This way failure can be a tremendous source of information and a powerful spur to growth and improvement.

#### Allergy to Ambiguity

Ambiguity, uncertainty, or complexity is discomforting to many of us. But some are positively allergic to it. They shrink from an ambiguous situation possibly because they feel unable to cope with it. Uncertainty for them amounts to chaos. They have an excessive need for order, structure, and routines, to simplify the job of living in a complex and dynamic world. They like to tread the beaten path, and in the process miss the opportunities that life presents for growth and creation. After all, had there not been people who delighted in exploring ambiguous situations, no science or art would have been possible. The very act of creation involves exploration of the terra incognita between the status quo and a dimly perceived excellence. Unhappily, where education is cramming-oriented and examinations reward memorizing rather than genuine insight, the spirit of enquiry begins to dim, and this weakens our ability to face up to ambiguity.

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The best antidote to the allergy of ambiguity is for us to experience stress from ambiguity. Then we would see for ourselves that it is not so terrible after all. Also, such confronting of ambiguity would enable us to experience the genuine exhilaration that comes from problem solving and unraveling of ambiguity. If we can joyfully do puzzles and play games, we can surely extract similar pleasure facing up to ambiguity in other spheres of life. Approaching complex situations as challenges and learning arenas rather than as mazes with no exits can be helpful in dissolving this block.

## Touchiness

Touchiness is the fear of humiliation and rejection. This is a serious block in those activities which involve collaboration with other individuals. People who are very touchy tend to have difficulty in approaching others for assistance or guidance, and in turn are likely to look with suspicion at attempts by other to be friends. Often such touchiness arises from a frail ego that wilts at the dropping of a hat. If one's self-concept and self-esteem are at the mercy of the opinion of others, the natural reaction is to insulate oneself, or to seek out only those that flatter.

A more realistic appraisal of one's strengths and weaknesses is a precondition for removing this block. The attitudes that criticism is as necessary for growth and maturity as praise, and that a warm relationship often is not a matter of love at first sight, but may be preceded by some bruising experiences, are helpful. Finally, we do not have to be loved by others for us to be able to work with them on tasks that are enriching to us. Touchiness should not prevent us from working with others.

## Conformity

Conformity creeps into us because of the fear of flouting social norms, the fear of social disapproval. A number of factors raise the desire for conformity. Fear of failure, touchiness, and allergy to ambiguity may make one escape into a safe, don't-rock-the-boat, conformist niche. Conformity permits a relatively risk-free existence through the acceptance of the status quo. It manifests itself in excessive allegiance to customs, traditions, rituals, and procedures. The conformist individual is often a conventional individual. An excessive desire for conformity is clearly a block to creativity, since creativity implies change in the status quo. Indeed, conformists have often blocked creative individuals. Jesus was destroyed by the Pharisees and Galileo was made to recant his theories by the Church. There is also some research evidence that conformity to social pressures dampens creativity<sup>4</sup>.

Some conformity is, of course, essential for any social existence. But without creativity, a society would soon face extinction since the world keeps on changing, thereby making the status

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quo obsolete. Societies that adapt quickly tend to survive and prosper; those that stick to conventional modes are often superseded by those that do not.

The roots of conformity may go deep, into child-rearing practices, into what is considered right and wrong behaviour, and the severity with which deviation from socially prescribed behaviour is punished. Conformity cannot be got rid of easily. Active questioning of conventions and habits, exposure to dynamic cultures, and rewarding of creative forays, however, can break the shackles of conformity. A study of individuals who successfully broke conventions can also fortify one's resistance to conformity, as also friendship with unconventional types.

## **Resource Myopia**

The inability to see the resources at our disposal is a common block to creativity. We are often unaware of our own strengths. The resources at our disposal are usually much larger than we imagine. Consider a man like Nelson Mandela. He had no formal authority nor, to begin with, any exceptional gifts. But by his pen, by his speech, by his example, and by his ability to bring together dedicated men and women, he was able to move mountains, so to speak. The ability to perceive one's strengths and weaknesses accurately and the awareness of the resources in one's environment are indispensable for overcoming resource myopia. Curiosity about the situation one finds oneself in, the habit of asking around who has what resources and where, the managerial trait of being able to draw readily on the resources of others, are worth cultivating to get rid of this block. Resource myopia gives rise to a number of other disabilities that also hinder creativity. The chief of these are fatalism, excessive dependence, 'learned helplessness', and inferiority complex. All these disabilities arise because resource myopia makes us poor problem-solvers.

## **Starved Sensibility**

Some aspects of modern civilization seem to have been designed to dull our sensibilities. Our ability to imagine and to fantasize, so abundant in our childhood, is often starved out by the constant admonition to 'stop daydreaming', 'stick to facts', and 'be precise'. Over-specialization in studies and at work, too, may limit our awareness of the world around us. Besides imagination, emotions, can also be starved by the constant pressure to 'keep control', 'not be emotional', and 'be rational'. We often forget that it is feeling that gives meaning to our actions, and that without the energy supplied by emotions, no great tasks could be accomplished. Idealism, love, hate, compassion, yearning for peace, as well as ambition are emotions that have time and again reshaped the world. Not only fantasy and emotion, our senses, too, can fall prey to the press of 'civilization'. Our senses of hearing, touch, smell, taste, and sight are needlessly atrophied through neglect. In some of us, these are also atrophied through the belief that mortification of the flesh is necessary for spiritual growth.

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There are two reasons why the cultivation of our senses can increase our capacity for divergent thinking and creativity. First, they can enhance our pleasure and spur us further to creative ways of enhancing it. A cultivated palate helps one become a better chef, or at least makes one want to patronize an imaginative chef. A cultivated sight is necessary to be a good painter, or at least to enjoy good painting. So cultivated senses are necessary for us to have or want to have refined aesthetic experiences, and thus are a necessary foundation of all that is graceful and artistic in life. But besides this, senses are the filters through which we get outside stimulations. If these filters are opaque, they block a lot of sensations that could otherwise have triggered creative processes within the mind. In studies of creative individuals, what comes across again and again is the freshness and vividity of their perceptions.<sup>5</sup> Like stunted, shriveled plants, starved sensibilities have to be revived through a more nutritive soil and better watering, that is to say, by conscious cultivation of sensibilities. The impediments to the growth of sensibilities have to be removed, such as the notion that fantasying is a waste of time (Einstein thought that imagination is more important than facts), or that facts are better than feelings, or that the body is a source of evils and enticements. Coupled with this must be a deliberate effort to fantasize creatively (e.g. by reading mind-bending stuff), feel richly (try recollecting vividly your most pleasurable and painful moments), and enjoy the poetry of the body. A lively interest in the arts, nature, science, and sports, wide reading and interesting hobbies, and friendship with receptive persons should crack the block of starved sensibilities.

#### Rigidity

A common block to creativity is rigidity. Rigidity can come in many forms. Failure to adapt, despite the need for modifying behaviour, is one form. In other words, a formula approach to life is evidence of rigidity.<sup>6</sup> Years ago, some interesting experiments were conducted to measure rigidity. Subjects were given a series of water jar problems. For each problem, they were given the water holding capacity of three jars A, B, and C. They were told that there was a tank of water from which they could draw whatever water they wanted. The problem given to them was to measure out a specific quantity of water. For instance, in one problem they were told that A holds 21 litres, B holds 127 litres, and C holds 3 litres. The subject was required to produce 100 litres. Here, the solution is B-A-2C. Next, a series of problems that could be solved by this formula were given to the subjects, so that they learnt the formula well. Then they were given holding capacities of the jars as 23, 49, and 3 for the three jars and asked to produce 20 litres of water. The answer could be got by the formula B-A-2C, but it could also be obtained by the much simpler A-C formula. In an experiment involving hundreds of subjects drawn from colleges, adult education classes, and schools in the New York area, 50% to 75% of subjects that had learnt the B-A-2C formula applied it to problems where a much shorter method (e.g., A-C) could give the same answer. In a problem where B-A-2C could not be used but A-C could give the same answer, 50% to 90% of the members of the experimental groups failed to solve the problem.

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Virtually no one in the control groups failed to solve the problems (the control groups had not learned the B–A–2C formula). These experiments indicated that rigidity comes from over-learning, that is to say, from persisting in applying a generalization valid in one set of circumstances to circumstances in which it is not valid.

Rigidity or over-learning comes in several forms, three of which are fairly common. One is stereotyping, the second is dogmatism, and the third is functional fixedness. Stereotyping was a term invented by Walter Lipmann, a well-known American columnist. Stereotyping is a generalization without sufficient evidence about a quality or attribute of members of a class of people. For instance, a person may encounter a few intellectual Brahmins and from this leap to the conclusion that all Brahmins are intellectual. Similarly, some people hold such stereotypes as Muslims are fanatical or Englishmen are cold, and so forth, on quite skimpy evidence. Stereotyping has its uses. Once a person or an object is pigeonholed, we can deal with him or it with the confidence that comes from familiarity. But stereotypes can also blind us to uniqueness and diversity. Also, stereotypes sometimes indicate sickness in the personality of those that hold them. If the parents have been especially harsh or uncaring in childhood, the child's repressed hostility finds convenient outlet in adulthood in the form of hate-filled stereotypes of minorities, subordinates, and other relatively defenceless persons.<sup>7</sup> This was one explanation for German Fascism and its vicious hatred of Jews.

A second form of rigidity is dogmatism, the passionate holding of beliefs not warranted by information. Dogmatism is closed-mindedness,<sup>8</sup> and in extreme cases assumes the form of fanaticism. Dogmatists accept only information that is consistent with their preconceived beliefs. Inconsistent or contradictory information is dismissed, suppressed, denied, or twisted around to accord with one's dogma.

A third form of rigidity is functional fixedness.<sup>9</sup> People who have functional fixedness are fixated on some one specific function performed by a tool or an object, and are unable to see, or resist seeing, other possible uses. A bottle may be seen merely as a container while its possibilities for decoration, defence, and art may be overlooked. A servant is defined as, well, just a servant. His potential to be a companion, a friend, a story-teller, an artist, a problem solver, a crisis manager, a guard, and so forth may be overlooked.

Stereotyping, dogmatism, and functional fixedness seriously impair several creativity-related abilities, particularly fluency and mental flexibility. Stereotypes and dogmas are often deep-rooted. If they have been formed because of wrong information they can be removed by right information. If, however, they have been acquired to maintain sanity in the face of overwhelming internal conflict or frustration, and their function is to displace the internal turmoil on to the relatively weak and defenceless, information may make them even more absurd. The person attempting to remove a stereotype held by another person must be trusted and seen by the latter as a friend or a mentor, for the former's attempt to have a chance of success. Once fear and hatred are peeled off, the human psyche is more open to reason and information.

As we have seen, functional fixedness arises from over-learning. Instead of stimulus evoking several responses, the individual learns just one dominant response, such as chalk=writing on the blackboard, and lamp=light. Some unlearning is necessary for getting rid of functional fixedness. Techniques of creativity like attributes changing and brainstorming can be especially helpful. These can help one see multiple uses of tools and objects, where earlier just one was known.

It is worth noting that these blocks are not wholly harmful. Some of them, in mild forms, may even be useful. For instance, a mild fear of failure galvanizes rather than paralyses, and moderate conformity helps win acceptance of oneself as a change agent. Some others, though harmful to creativity, have other uses. For instance, rigidity sustains one in times of stresses and strains, as exemplified by the survival of those minorities, such as the Jews, who rigidly adhered to their beliefs and traditions in hostile times. Touchiness may spur one to absorb oneself in solo activities like mathematics or poetry. It is precisely because blocks have some functional value that so many have them. A deeper understanding of why one has the blocks one has, what functions are served by them, as well as how they impede creativity, should lead one to a more conscious choice of action to take. Table 13.1 summarizes the blocks, their main causes, their symptoms, their usefulness, and the way they obstruct creativity. They are conveniently divided into fears and disabilities. The four fears are the fear of failure, confusion, humiliation, and social disapproval. The three disabilities are those of resource myopia, starved or shrivelled sensibilities, and rigidity.

## **FEARS AND DISABILITIES**

There may be an interesting relationship between fears and disabilities. A person with many fears may take very few initiatives and restrict himself to only those activities in which he feels safe. As a consequence, he may exercise only a few of his capabilities, and thus come to have disabilities like stereotyping, resource myopia, and starved sensibilities.

Equally, a person having these disabilities may experience painful feelings of inadequacy in a wide variety of relatively unfamiliar activities, and come to fear failure, ambiguity, humiliation, and social disapproval. It is likely, therefore, that fears breed disabilities and vice versa, that is, fears and disabilities constitute a vicious cycle. In the data on participants in workshops conducted by me, these two were strongly correlated.

If the foregoing is true, then it should follow that getting rid of a fear or a disability should trigger a beneficial cycle of reduction in the remaining blocks also. Relatively speaking, starved sensibilities may be the easiest block to get rid of. For, basically it requires exposure to things and activities that energize various sensibilities like imagination, feelings and emotions, the sense of touch, smell, sight, taste, and hearing. A little brainstorming may reveal dozens of very practical

and Harms
Uses,
Symptoms,
Causes,
Their
Blocks,
TABLE 13.1

	Fears/Disabilities	Causes	Symptoms	Uses in Mild Form	Harms in Extreme Form	
_:	Fear of failure	Excessive punishment of failure or excessive concern with loss of face or honour due to failure	Tendency to stick to safe options, to avoid competitive situations, or to participate only in those activities where one is sure of winning; tendency to look for alibis for failure; excessive fright and nervousness in test situations	In a mild form, fear of failure galvanizes a person to a better, more focused effort at a task.	In a virulent form, it can prevent one from taking risks and in getting involved in activities in which one initially has low skills. This impedes divergent thinking and activities. It can paralyse one due to stresses arising from taking on divergent, off-beat, path-breaking activities.	
5	Allergy to ambiguity	Excessive spoonfeeding and structuring of thinking; having an excessively routinized life; excessive specialization	Tendency to avoid unclear tasks and complex, brain-teasing tasks	In a mild form, it helps a person to seek to clear up confusion and thereby take clear and effective action.	In a virulent form, it makes a person shun the paths of invention, discovery, and creation, because of their 'messiness'	

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	Fears/Disabilities	Causes	Symptoms	Uses in Mild Form	Harms in Extreme Form
ю.	Touchiness (fear of humiliation)	Being painfully rejected or humiliated in the past, resulting in lack of self-confidence and low self-esteem	Aversion to meeting even interesting strangers; tendency to seek flatterers; wanting to stick to the same old group; coldness towards 'threatening' persons; a bearing of false hauteur; excessive shyness	For certain kinds of artistic and scientific work, touchiness provides a shield from intruding outsiders. A sense of loneliness may direct energy towards creative activities of a non-interpersonal contact type in which one can get immersed and thereby forget one's loneliness.	In creative activities that require interpersonal collaboration, touchiness can be a major impediment. It may also make a person averse to seeking feedback, so indispensable in the uncertain vistas of creative activity.
4.	Conformity (fear of social criticism or punishment)	Brainwashing into obedience to seniors, elders, and social norms; severe punishment for deviating from prescribed standards of behaviour	Herd mentality; lack of independence in judgement; excessive attachment to traditions; dislike of innovations that go counter to traditions	Some conformity is indispensable for collective existence. Some conformity to norms of society or collectivity helps one get acceptance, and thus paradoxically facilitates a subsequent change agent role.	Resistance to innovative ideas and divergent thinking; missing of opportunities for growth and self-actualization.
	Resource myopia (a feeling of resourcelessness)	Excessive dependence, spoonfeeding, single track existence; being excessively sheltered from difficulty and challenges; lack of experience in dealing with problems	Tendency to get dependent and become passive; feeling of helplessness; participation in a very narrow range of activities	None	Inhibits innovation and divergent activities and also risk taking

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TABLE 13.1 7

	Fears/Disabilities	Causes	Symptoms	Uses in Mild Form	Harms in Extreme Form
	Starved sensibilities	Overspecialization in activities;	Feeling of dullness; inability to	In efforts requiring great	Starved sensibilities reduce the
		brainwashing into single-track	feel or experience or imagine	concentration and	supply of stimuli that may
		purpose or goal of life; an ethic	richly	single-mindedness, some	trigger divergent thinking. They
		of asceticism		neglect of sensory stimulations	reduce curiosity and openness,
			_	can release energy for the task	and the sense of fresh
				at hand.	encounter with life.
Ŀ.	Rigidity	Ignorance; deep-seated anxiety	Tendency to stereotype, be	Provides some protection in a	Serious impediment to growth,
		or conflict or hostility	dogmatic, and to get fixated on	highly turbulent or hostile	experimentation, learning and
			very particular uses, tools,	situation, and therefore has	innovation
			ideas, arrangements; inability to	some survival value; to an	
			assimilate new information and	extent, simplifies life	
			to learn and change		

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ways to energize one's sensibilities, such as acquiring interesting friends and hobbies, meditation, excursions, reading, artistic activities, and so forth.

## **STRATEGIES FOR UNBLOCKING**

Some of the major steps that can be taken for unblocking are outlined below.

#### Awareness

Most people are, to an extent, aware of their blocks. Completing and scoring the instrument labelled *My Temperament* may give you a clear idea of your blocks, at least those which you are conscious of or are willing to acknowledge.

But some blocks have very deep roots in the defence of the personality. One may be even blind to their existence. A useful step may be to ask someone who knows you intimately to complete *My Temperament* with respect to you. You can then jointly look at the data. You can identify those items where both of you agree on what your blocks are. Equally, you can identify those items where there is sharp disagreement. For instance, you may strongly disagree with the statement: "I prefer to give up when I hear that a task is too difficult." But your intimate friend may agree with the statement as it relates to you. This can start a sharing of perceptions. He can tell you his experiences with you that have led him to his conclusion, and you can recall incidents that have led you to yours.

This kind of sharing of factual information (more than mere opinions) can lead to your getting a much better insight into your blocks.

#### **Analysis and Diagnosis**

Having made a tentative identification of one's block or blocks, it is desirable to study each in some depth. One could reflect upon the situations triggering the block. One could recall the feelings that are aroused when the block is operating, think back to those experiences that could have caused the block, analyse those of your habits that strengthen the block, etc. Some reading in 'depth psychology' associated with Freud may also help, particularly the reading of various defence mechanisms like projection, scapegoating, reaction formation, repression, suppression, sublimation, etc.<sup>10</sup>

As part of the process of analysis and diagnosis, it may be useful to discuss your block with an individual who also had the block but was able to get rid of it. People who have come up the hard

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way may be good mentors for unblocking purposes. At the least, reading about such individuals can also be useful.

## **Desire to Unblock**

People retain blocks because they provide some security from the real or imaginary onslaughts of the world. Like the veteran prisoner of Chillon, who got fond of his chains, we often get comfortable with our blocks. We need to develop a strong desire to unblock to be able to cope with the 'withdrawal symptoms' while attempting to give up a block. The first few attempts at unblocking are likely to be awkward, with many failures and only a few successes. One needs to strengthen one's faith in one's capacity to unblock; one also needs to strengthen one's need to unblock. Meeting people who have freed themselves from their blocks and are leading a much richer life, or reading about them, should help. Programmes like sensitivity training, Est, and transactional analysis should help in unblocking as well as in strengthening one's resolve to break out of the tyranny of blocks.

*Mantras* or chants can sometimes be helpful. If you are the type that is helped by a chant, try the following.

AA, FF, C or T I am about to shed thee RM, R or SS All go out with express!

## Help from a Credible Source

Awareness of, and information about, a block is useful, but often not enough. A person one trusts and admires such as a mentor can be very useful in overpowering the block. It is necessary to confide in the person, and to turn to him or her in moments of stress. Some ventilation of fears and feelings and a little guidance and encouragement from such a person can go a long way. Perhaps you can get him or her to take advice and encouragement so that whenever you feel depressed at not making progress, you can play back the tape and get fortified.

#### Inoculation

Often it helps to get rid of a block by stages. If one has fear of water, one first enters shallow water, and only after some inoculation one goes deeper and deeper. The inoculation strategy is particularly helpful in getting rid of such deep-rooted fears like the fear of social disapproval or humiliation or failure or ambiguity. For getting rid of these fears, it makes sense to seek at first those situations that are only mildly uncomfortable or painful, succeed in restraining the block, and then take on more 'risky' situations.

#### Reward

As psychologists have often demonstrated, rewarding of new behaviour patterns leads to their becoming durable. With respect to unblocking, one can join institutions where unblocking is rewarded (such as a public speaking class, in which even modest success in overcoming fright in giving speeches is applauded). One can arrange with a friend to reward one's attempts at unblocking. For example, one can give a friend some money, and ask him/her to pay a tenth every time one succeeds in overcoming a block. (I tried this with considerable success on a tongue-tied student who was doing very poorly in a class where class participation carried a heavy weight in the final grade.) One can even reward oneself, such as giving oneself an ice-cream treat at every success.

## **Goal Setting**

After some success at unblocking, it may be useful to set some goals and targets that assume the absence of the block. Thus, one may ask of oneself, "If I had no fear of failure, what should I be striving for? What should I be doing?" The target may not be anything very grand. It may be nothing more than taking up a sport one has wanted to but has not because of fear of failure. The important thing, of course, is to pursue the target. This may well uncover some hidden strengths within you and give you a lot of confidence, besides wearing out the block.

Thus, awareness, diagnosis, support from a credible source, inoculation, rewarding of unblocking, and appropriate setting and pursuit of goals may go a long way in getting rid of some debilitating blocks.

## **ENERGY FOR YOUR CREATIVITY**

Remember the model of creative personality with which we started in Chapter 12 (Figure 12.2). Essentially it says that creativity traits + creativity motivation – mental blocks to creativity is equal to enduring creativity potential. You may like to assess your potential periodically by completing the instruments given in the appendices to this and the earlier chapter, and scoring your traits, motive strengths, and blockage. The following formula may be helpful.

% score of your creativity traits + % score of your pioneering – innovating motive + % score of your self-actualization motive + % score of your altruistic motive + Lifelong Creativity

% score of your competence motive – % score of your safety motive – % score of your status motive – % score of total blockage.

A net score below 50 needs urgent attention. Identify your weak spots and attack them vigorously. Try to raise your score (without cheating, of course) beyond 100.

## **CONCLUDING COMMENTS**

There is a wider social implication of creativity traits, motivation, blockage, and their inter-relationships. The large fluctuations in the innovativeness of many societies-Chinese, Egyptian, Greek, Roman, Russian, British, and Indian, to take a few examples-during their histories has been something of a mystery. Could it be that parenting and schooling practices are responsible? The work of David McClelland, a psychologist, suggests this.<sup>11</sup> In his study of contemporary as well as older societies, he found that when the basic study materials of children were infused with achievement themes, the societies tended to become entrepreneurial and economic development picked up. I suspect that when parenting and schooling in a society emphasize caution and conformity, the majority of children grow up minus many creativity traits and the motivation for creative achievement. The society goes downhill due to the vicious cycle of blocks sapping creative initiatives thus further nourishing blocks which further sap creativity, and so on. Over a period of time a creative society turns timid, conformist, and conservative. The vicious cycle needs to be reversed. Blocks need to be shattered and creative initiatives need to be encouraged to trigger an upward, beneficial cycle. I suspect that the European renaissance and its American extension were powered by this dynamic, and it may also be powering the renaissance in southern and eastern Asia. About time we tempered with the parenting and the schooling in conservative societies and communities!

## Quiz

Do you agree or disagree? Why?

I Teachers have more mental blocks than their students.

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2.	Those who stress discipline are hampering creativity.
3.	Fear of failure is the prime inhibitor of creativity.
4.	Rural people are more blocked than urban people

## MENTAL GYM

1. Mental blocks are not the monopoly of the mediocre. Towering personalities also have them. From biographical materials, try and find out the mental blocks that Mahatma Gandhi, Isaac Newton, Friedrick Nietzche, Mao Tse Tung, Leo Tolstoy, and Rainer Maria Rilke had, and how they overcame them or compensated for them.

How will you help a fearful child overcome its fears?
 If you were the leader of a conservative caste or community, what could you do to make the members more innovative?

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4. Suppose a youngster wants to make a career as a guide, her father wants her to become a professor (like him), and her mother is worried about her health and marriage prospects if she becomes a guide. Now write out a post-dinner dialogue between the three concerning her career.

## APPENDIX 13.1

## My Temperament

Name:

Time: 10 minutes

Date:

Please read each statement given below and write in the *right* margin the appropriate number to indicate *your* opinion on each statement. Since this is a feedback instrument, be as truthful as you can.

- 6 = completely agree
- 5 = strongly agree
- 4 = moderately agree
- 3 = moderately disagree
- 2 = strongly disagree
- 1 = completely disagree

		Rating
1.	I dislike unfamiliar situations.	
2.	There is a great danger in giving up our old customs and traditions.	
3.	I can predict the behaviour of a person if I know his social background.	
4.	I prefer to give up when I hear that a task is too difficult.	
5.	You can't be called mature unless you can really control your emotions.	
6.	I don't think I have any very distinctive skills outside my area of specialization.	
7.	I like to make friends mostly with those who appreciate me.	
8.	I resist expressing tenderness towards others.	
9.	If you don't plan your holidays in detail, you just end up wasting time and money.	

		Rating
10.	Parents know best what occupations their children should pursue.	
11.	You can make out what people are like by noticing the way they dress.	
12.	I don't like to compete with strong opponents.	
13.	I rather dislike sad movies.	
14.	At work or studies, I generally don't share problems with colleagues to seek their guidance.	
15.	I really dislike any criticism levelled against me.	
16.	I have very little interest in flower arrangements and the like.	
17.	I prefer a boss who tells me precisely what I am supposed to do.	
18.	Women should not dress like men and vice versa.	
19.	I am more comfortable after I have classified a person.	
20.	I dislike being compared to others.	
21.	No matter what choice of food I have in a restaurant, I like to order the same old favourites.	
22.	I don't think Third World countries have the resources to catch up with the First.	
23.	I dislike subordinates trying to be familiar with me.	
24.	Giving in to the pleasures of the body detracts from high thinking.	
25.	I can't stand meetings without a clear prior agenda.	
26.	Premarital sex is immoral.	
27.	Necessities must always have priority over artistic matters.	
28.	I hate to lose at games.	
29.	I have never bothered myself with modern art.	
30.	I don't think I can do well in a job or occupation very different from my present one.	
31.	I feel tense communicating with persons who have greater authority than I.	

Weakening Our Inner Sensors

		Rating
32.	I can't be bothered with questions such as "What would happen if birds had brains like humans and humans had wings like birds?".	
33.	I hate confusion.	
34.	One must fulfil one's social obligations at any cost.	
35.	People in the same profession have similar personalities.	
36.	In a meeting, I don't speak up unless I am an expert on a point.	
37.	A pound of imagination is not worth an ounce of facts.	
38.	One can accomplish little without the support of the authorities.	
39.	I don't like being contradicted in the presence of others.	
40.	I don't like to see serious plays or movies.	

## Key to Scoring the Your Temperament Instrument

1. *Allergy to ambiguity*: aggregate the scores for the items 1, 9, 17, 25, and 33 and divide the total by 5. From the resulting score, subtract 1, and then multiply this by 20.

Example: Suppose your scores are 4, 3, 2, 3, and 4 respectively. These total 16. Dividing this by 5 gives 3.2. Subtracting 1 gives 2.2. Multiplying 2.2 by 20 gives 44%. This is your % score for this block. The higher the score, the greater the block.

- 2. *Conformity (fear of social disapproval)*: Aggregate your scores for items 2, 10, 18, 26, and 34. Thereafter, derive your % score as indicated above.
- 3. *Fear of failure*: Aggregate scores for items 4, 12, 20, 28, and 36. Derive % score as in 1.
- 4. *Touchiness (fear of humiliation and rejection)*: Aggregate scores for items 7, 15, 23, 31, and 39. Derive % score as in 1.
- 5. Average for fears: Take the average of your % scores for allergy to ambiguity, conformity, fear of failure, and touchiness.
- 6. *Resource myopia*: Aggregate scores for items 6, 14, 22, 30, and 38. Derive % score as in 1.
- 7. *Rigidity*: Aggregate scores for items 3, 11, 19, 27, and 35. Derive % score as in 1.

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- 8. *Starved sensibilities*: Aggregate your scores for items 5, 8, 13, 16, 21, 24, 29, 32, 37, and 40. Divide the total by 10 to get an average. Subtract 1 from this and multiply the result by 20 to get % score.
- 9. *Average for disabilities*: Average your scores for resource myopia, rigidity, and starved sensibilities.
- 10. Total blockage: Average your scores for fears (5 above) and disabilities (9 above).

 TABLE A13.1
 Strength of Blocks to Creative Functioning of Participants of a Creativity Workshop

(Number of participants-16)			
	Average score at start of workshop	Average score at end of workshop	
Fears			
Fear of allergy to ambiguity, uncertainty	57%	38%	
Conformity (fear of social disapproval)	35%	28%	
Fear of failure	37%	27%	
Touchiness (fear of humiliation, rejection)	33%	23%	
Average for fears	40%	29%	
Disabilities			
Resource myopia	30%	17%	
Rigidity	45%	30%	
Starved sensibility	43%	32%	
Average for disabilities	39%	26%	
TOTAL BLOCKAGE (average of fears and disabilities)	39%	27%	
(Note: The higher the score, the greater the blockage).			

## Personal Strategy for Overcoming Key Blocks to Creativity

- 1. What are my main blocks to creative functioning?
- 2. How do I know that they exist?
- 3. During which *incidents* did I feel especially blocked?

- 4. What can I do *myself* to overcome these blocks? (Consider diagnosis, finding a mentor, inoculation, and rewarding of unblocking.)
- 5. How *can I* utilize the resources of my family, friends, boss, colleagues, subordinates, experts, etc. to help me overcome these blocks? How can I overcome the blocks *they* may be presenting for my creative functioning?
- 6. My programme of *action* to overcome the blocks during the next week. (Consider goal setting.)
- 7. My programme of *action* to overcome the blocks during the next one *month*.
- 8. My long-term plans for unblocking.
- 9. Complete Your Temperament periodically, and chart the changes in your blocks.



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# Designing a Creativogenic Environment



In the previous four chapters we looked for ways of sustaining lifelong creativity by bringing about changes within us—in our problem-solving process, in our intelligence, in our personality. In this chapter we look for ways of changing our environment so that it nurtures our creativity. Action within us and without needs to be synchronised for raising the quality and durability of our creativity.

Our environment is an important shaper of our creativity. The more congenial the environment for creativity, the more permanently one is likely to be creative. Silvano Arieti has called such an environment creativogenic.<sup>1</sup> For lifelong creativity, it

is important to understand how the environment affects our creativity, and how we can migrate into more creativogenic environments.

There is a view that creative genius flowers only in adversity. To be sure, there are examples of outstanding creators who were born disadvantaged.<sup>2</sup> Mark Twain was born in a hamlet to poor parents;

A wise man will make more opportunities than he finds Francis Bacon



Renoir, Rodin, and Walt Whitman were sons of labourers; Chekhov and H.G. Wells were sons of petty shopkeepers; Sun Yat Sen, Alexander Flemming, and Henry Ford were born to farmers; and so on. But a much larger number did have congenial early environments.<sup>3</sup> Scientists like Charles Darwin, Max Planck, and Guglielmino Marconi; philosophers like Henri Bergson, Karl Marx, and Albert Schweitzer; and artists, composers, and writers like Pablo Picasso, Igor Stravinsky,

Franz Kafka, Ernest Hemingway, Robert Frost, and André Malroux were born in well-to-do middle-class families. The philosophers Bertrand Russell and William James, the painter Toulouse Lautrec, and the statesmen Winston Churchill, Jawaharlal Nehru and Franklin Roosevelt were born aristocrats. Several had talented relatives to interact with. For example, Charles Darwin's grandfathers were both talented. One was a botanist, philosopher, and physician, while the other was a craftsman and a famous maker of delicate pottery. Planck's father was a professor. Henri Bergson's father was a musician. Churchill's grandfather was a British prime minister and Roosevelt's cousin was a US president. Picasso's father was a professor and art teacher. Many of them had excellent education at some of the best institutions in the world. Gandhi, Jagdish Chandra Bose, and Tagore were born in well-to-do, reasonably liberal (for their times) families, and in the case of Gandhi and Bose, educated abroad. Obviously, family wealth is not enough by itself. But some material ease plus a liberal, progressive outlook at home plus a decent education plus talent may sharply increase the chances of one's creative efflorescence.

Our various environments profoundly affect our attitudes, traits, abilities, and behaviour. As children we absorb various formative influences from our family members and our teachers. In our teens, we are strongly influenced by our friends, professors, and heroes of whatever culture we happen to live in. Later, our work organization is an important element that shapes us. So do our spouses, children, friends, and the norms of our reference group (the social class whose membership we desire). Among the aspects of our personality, our creativity, too, is likely to be shaped by these various environmental factors.

A comparative study of creative Indian musicians and non-creative white-collar workers illustrates the role the environment may play in people's creativity.<sup>4</sup> There were several interesting differences in the backgrounds of the two groups. For instance, compared to the non-creatives, the creatives tended to come from relatively better off or well-to-do families and most of their parents had artistic interests. Their early upbringing was more often in urban settings. Interestingly enough, the creatives reported more discord at home (with their fathers, between their parents) and greater closeness to their mothers. The creatives commonly regarded the teacher (usually the music master or *ustad* that had trained them) as the most influential person in their life, while the uncreatives usually indicated the father to be the most influential person in their life. While the creatives may have been more talented to begin with, it also looks as if their

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home environment assisted in the flowering of their creativity (more resources, a pro-art atmosphere at home, and greater access to good teachers who normally congregate in cities for their livelihood). Discord at home, especially with the fathers, may have prompted the creatives to choose independent careers. The musician, in India at least, is a sort of an entrepreneur, usually operating on his/her own rather than, as in the West, as part of an ensemble or an organization. Interestingly, a study of American business entrepreneurs has also noted the syndrome of childhood closeness with the mother and conflict with the father.<sup>5</sup> Conflict in childhood with boss figures may well culminate later into a desire for relatively autonomous careers, and this may prompt entrepreneurial creativity. Equally, a happy relationship with boss figures in childhood may predispose a person to adjust relatively easily to jobs with little personal autonomy, such as white-collar jobs. Also, while the nurturant mother may help one to sustain one's faith in one's creative potential in the face of paternal criticism, especially when the parents themselves do not get along with one another, the same nurturant mother may make a person conform to parental wishes if the parents get along with one another and the conflict with the father is moderate.

Thus our environments shape, though they may not determine, our creativity in various ways. A punitive environment can instil in us much fearfulness and blockage. On the other hand, a cultural or family environment that encourages risk taking or experimentation may stimulate a strong pioneering or innovative effort. Thomas Alva Edison, for instance, was blessed with a mother who valued ingenuity in her child more than formal education (this foremost inventor had no more than three months of schooling).<sup>6</sup> He also lived in a culture that handsomely rewarded initiative and practical invention. These environmental factors, combined with his innate ability, led him to a tremendously successful life as an inventor.

Environment not only shapes personality, it may also influence various creativity-related abilities. A liberal home may, through the mechanism of dining-table or living-room clashes or debates, instil a good deal of mental flexibility. A home or academic or work culture characterized by commitment to experimentation and discontent with the status quo, may stimulate original thinking. In creativity courses, the emphasis on the deferred evaluation principle has often led to significant increase in fluency.<sup>7</sup> Certain occupations such as those of the teacher and the writer, may significantly increase the capacity for elaboration, and occupations like those of the detective, the policeman, the journalist, and the researcher, may significantly increase problem sensitivity. Thus, one's childhood, social, and work environments may rather importantly shape the personality traits and abilities related to creativity.

Besides shaping personality and ability, the environment may block or facilitate creative activities themselves. Many a government-owned lab managed bureaucratically has driven a creative scientist to extreme measures, including, on some occasions, suicide. Equally, innovative rural citizens without opportunity back home, have become thriving entrepreneurs, professionals, or thieves in the opportunities-rich clime of a big city. Research indicates no general superiority of male collegians over female collegians on tests of creativity. And yet, in most fields other than home management, creative males vastly outnumber creative females,<sup>8</sup> suggesting the inhibiting effect of the environment on female creativity.

Let us look more closely at our formative and adulthood environments and how they shape our creativity.

# FORMATIVE ENVIRONMENT AND CREATIVITY

#### **Childhood Home Environment and Creativity**

The kind of childhood one has at home may profoundly influence the kind of person one becomes. There are several dimensions of the child's home environment. Does it repress creative behaviour or is it encouraging? Is it a dull, monotonous environment or is it stimulating? Does it induce a single ideology (world view, morality, religion) or does it expose the child to diverse viewpoints? Does it induce fatalism and low aspirations in the child or does it induce soaring aspirations? Does it promote the norms of conformity and conventionality or does it promote individuality, self-actualization, uniqueness, making a distinctive contribution, and so forth? Fairly extensive research paints an interesting picture.

Rigidity, conventionality, and authoritarianism–depressors of creativity–are known to be induced by a harsh, discipline-oriented, conformist home environment.<sup>9</sup> On the plus side, a study by Getzels and Jackson suggests that parents who encourage off-beat hobbies, interests, and careers, and do not over-emphasize academics, tend to stimulate their children's creativity.<sup>10</sup> There is also evidence that children who get special attention, such as first-borns–and the high expectations that go with attention–tend to be more creative, although this could be a chicken-and-egg problem.<sup>11</sup> Secure, non-conventional, 'arty' parents tend to have creative children.<sup>12</sup> Parents intensely involved in their children's talent development, who go out of their way to find the best tutors, also tend to have creative children.<sup>13</sup> Several other characteristics of parents are associated with their children's creativity, such as low authoritarianism,<sup>14</sup> ethical but not overly religious convictions, respect for their children, low sentimentality, the mother having her own career, etc.<sup>15</sup> An intriguing finding is that the early loss of a parent seems to characterize eminent creative persons far more that the general population.<sup>16</sup> This may be a maturing trauma and/or may imply greater attention to the child's growth from the surviving parent.

Some Australian research indicates that children's creativity is related to how far parents prefer a complex and stimulating environment at home.<sup>17</sup> Frequently, the mothers are educated professionals with unusual religious beliefs, and both the parents have relatively egalitarian

beliefs. Canadian research indicates that scores on divergent thinking tests tend to be lower for people coming from large families as compared to those coming from small families,<sup>18</sup> presumably because the child or children get more individualized attention and facilities in a smaller family. Soviet research emphasizes the importance of creativity at home. In a study of the development of talent of 50 fiction writers, 54 writers of non-fiction, and 45 artists, the single most important factor in talent development appeared to be creative activity in the family.<sup>19</sup> Reviewing the findings on eminent people, Robert Albert opines that persons who are eminent because of their original and significant contributions come from different families than high achievers; solid, conservative families produce achievers, while risk taking, enterprising families produce eminent creators.<sup>20</sup>

A more elaborate picture of the role the home plays in creativity was provided in studies of highly creative adults at the IPAR in California, US.<sup>21</sup> The researchers tried to reconstruct from tests and interviews the kind of family life the creatives had. Apparently, the parents gave a lot of respect to the child and expressed confidence in its abilities; they gave it an unusual degree of freedom to explore. The child had a plentiful supply of diverse and effective role models. The father typically pursued an exceptionally demanding career, and the mother had her own distinctive interests and career. There was discipline at home but it was consistent, and the norms and limits of behaviour were made clear to the child. At home, a personal code of ethics was emphasized rather than formal religious practices. The stress was on values like integrity, quality, intellectual and cultural enterprise, ambition, striving for success, and doing the right thing. The parents did not pressurize the child to pursue a particular career. The child was allowed to develop at its own speed. Interestingly, the family frequently moved to new locations. Wherever it was located, the family tended to stand apart from its neighbours in terms of its greater intellectual, artistic, and cultural pursuits.

John Dacey's findings are substantially in accord with those of the studies by IPAR.<sup>22</sup> He studied a number of families of adolescents in New England in north-east US. Of these, 27 families had at least one parent who was judged to be a creative professional, another 29 had at least one youngster who was judged to be creative, and there were 20 families in which no member was judged to be creative. The research involved tests administered to the adolescents and interviews with the family members. It yielded interesting data on parenting styles. Dacey initially categorized parenting styles into authoritarian, permissive, and authoritative (fluctuating from authoritarian to permissive depending upon the parent's mood). But he found that a different, empowering style was employed by the parents of the creative adolescents.

These empowering parents were keenly interested in their children's behaviour, but enforced very few rules–just one on average (versus six for the non-creative families). The emphasis was on a set of values rather than rules. The parents expected their children to have outstanding traits of character such as honesty and trustworthiness. They allowed their children to make decisions, but

also took care to give feedback after the decision was made. There was seldom any punishment. But disappointing the parents was the main motivation for 'behaving'. In these families, there was much fun and pranks and inventing of comical names. These families tended to live in off-beat places and had off-beat collections (such as unusual teapots and birds). Most of the families were middle or upper middle class. Very early in the life of their children, the parents started encouraging the unusual traits of their creative children, and provided them with a wide range of opportunities to cultivate these traits. There is no evidence that the adolescents were creative only because of empowerment by their families. But empowerment at home surely augmented whatever creativity they had. Be it noted that empowerment did not amount to permissiveness. There was discipline but it was enforced more by values and conscience than by threats and punishment.

Mothers may play a very important role in the moulding of creative children. In one American research, the mothers of the 15 highest scoring children (within a sample) on tests of divergent thinking were compared with the mothers of the 15 lowest scorers.<sup>23</sup> Interestingly, the mothers of high scorers were emotionally less involved with their children, less likely to be seen as over-protective, and less likely to deny their anger and hostility towards their children. They were more self-confident, had higher occupational levels, and felt more self-realized in their homes. The research suggests that mothers that create growth space for their children **and** themselves are more likely to spawn divergent thinkers than those that treat their children–and themselves–as if the children are still in their wombs!

But there is a flip side, too, for some creatives. Dean Keith Simonton, in a study of 314 famous personalities from nearly 50 countries, found that while favourable home conditions seemed to spawn scientists, religious leaders, philosophers, labour leaders, editors, publishers, and reformers, writers tended to come from unhappy home environments.<sup>24</sup>

In a research I did on 160 Indian professionals, I found their childhood environments to be stronger predictors of their creativity and self-actualization motives than the school, current social, and current work environments. The more the childhood environment had been congenial to creativity, the more likely was the person as an adult to want to innovate, pioneer, or create, and the less concerned s/he seemed for financial security. In another study of 50-odd Indian innovative professionals, some facets of the childhood home seemed to shape later career and work choices. Homes that provided the child with the opportunity to learn hobbies from creative instructors, and homes where diverse viewpoints were freely expressed, seemed to induce the child as adult to choose creative life paths. Thus, early formative experiences at home tend to have far reaching consequences for the attraction the person, as an adult, has for creativity and innovation.

#### To Summarize

Research on how childhood home environment affects creativity suggests that a family life that encourages creativity, stimulates the child, exposes the child to diverse ideas and views, raises the child's aspirations to be distinctive, provides a fairly liberal and yet demanding moral grounding, provides freedom of activity as well as belief, provides the child good learning facilities, and so forth nurtures the child's creativity.

#### Schooling and Creativity

School can be an exhilarating experience of learning, growth, and creative activity (see box on *Creativity in the Kindergarten*). It can also, of course, be a nightmare of systematic snuffing out of divergent thinking and activity. Some Indian research indicates that school teachers tend to punish creativity and reward conformity and obedience.<sup>25</sup> Those lucky enough to go to 'open' and relatively less restrictive schools tend to score higher on tests of divergent thinking than students from 'closed' and relatively more restrictive schools.<sup>26</sup> K.S. Misra identified 19 characteristic features of classroom climate in schools in the town of Meerut in northern India that kill creativity.<sup>27</sup> In 86% of the observed classroom climates, all the 19 killers existed!

Commenting upon the relationship between the learning environment at school and creativity, Alicia Pagano wrote, "The development of creativity appears to be enhanced by

## **Creativity in the Kindergarten**

A playway kindergarten can be magical for little children. Lynn Johnson and Amos Hatch report a detailed study of the diverse creative behaviours of four four-years old American children, the ones they called Audrey, Shirley, Jack, and Gary.<sup>28</sup> Johnson and Hatch videotaped these children for 34 hours as they divided their time between their activity centres, namely, a sand/water table, a dress-up/housekeeping area, and a building blocks area. They observed the children for 72 hours and took notes, taped their interviews with the class teacher and the children's mothers, took numerous photographs, and scanned school records, reports, and so forth as also a daily log maintained by the teacher that recorded the activities of the children.

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Audrey was a loner but a gifted painter who loved to insert detail in her drawings, paintings, and craft work. She even used symbols. For instance, she painted a large heart that was seated on a rocking chair. She explained that the heart represented herself and her sister having a good time on their favourite chair. Audrey enjoyed experimentation. She used many different-sized brushes in her paintings to create special effects. She was quite resourceful. Once she splashed an unwanted colour over a rock she had painted. She thought about this, enlarged the rock with the splashed colour, and then painted the enlarged rock over with a dark colour to make it look like a boulder. Audrey was an observant child. Often she would stand near other kids, watch what they were doing (such as hole punching), and then do the same thing—but creatively. She was quite persistent. Once her mother found her engrossed for a long time - digging out bugs! She was a self-absorbed child. While she did not shun company, she also took little initiative in joining others in their play or activities. She would typically stand at the fringes, expecting to be invited in, and if she was not, she would give up and get busy prying into her own little world of imagination. Andrey exhibited her creativity most in her landscapes populated by people and animals, and provided life-like details in her drawings.

Jack was quite a contrast to Audrey. He was independent and strong-willed. He was not above pushing, showing, or even slapping others. He was especially bright, a quick learner, and very good at solving puzzles. At age four, he could already count up to 140, spell his name correctly, and knew the sequence in the letters of the alphabet. Like Audrey, he too, was a persistent child and got engrossed in his block building for long periods. He displayed a lot of mental flexibility. He utilized different sized blocks to produce rifles, lasers, and walkie/talkies, and once he instantly transformed the wall of a castle he had built into an organ keyboard! He was quite an expert in responding to changes in his social situation. For instance, if he wanted an entry into a group, he could use up to 9 different strategies—request, manipulative question ("When you say no, you don't mean me, do you?"), threat, begging, ingratiation, bribe, and so forth.

Shirley, again, was different from Audrey and Jack. She was quite versatile, good at many things, and interested in many activities. She was quite willing to give new things and ideas a try, and her manifold interests kept her quite busy. She was clever at counting, naming

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alphabet letters, reading, and recognizing shapes. She could think up quite original responses. For instance, when she was asked why our palms have lines on them, she said that this way it was easier for our hands to move (most others said "I don't know" or "That's the way we're made"). Shirley had an altruistic streak, and she often helped out others, paid attention to them, heeded their requests, and reminded others of rules. She was also a pleasant person, always smiling, and played with a large number of kids. She exhibited her creativity most often in the construction of three-dimensional products like egg cartons.

Gary was again quite distinctive. He was subject to epileptic attacks. But he was highly imaginative, especially in role playing and play acting. He would take on such roles as doctor, dog, baby, and ghost! He not only loved acting, he also enjoyed casting, and would assign roles to others during his dramatic productions. He was very energetic and enthusiastic, and used emotional and urgency ploys to get attention. Once, when he cooked up a murder mystery play, and could not get some boys interested in looking for the murderer, he yelled, as if in panic, "Hurry! Hurry! Watch out!" Once he got into a cradle for dolls, curled up under a blanket, and began making the cooing and gurgling noises of a baby. Soon, several girls were nursing him, patting him, fussing over him, and pretending to feed him! He was very popular, and liked to compliment others, including the teacher. He interacted with all the kids in the class. Like Audrey, Gary, too, had a flair for elaboration in drawing and storytelling. He was quite flexible in the use of dramatic props. A small piece of luggage could become daddy's briefcase for rushing off to office, as also a doctor's medical kit bag, depending on the play he was enacting. He was quite a champion at asking "Why?" Like the other three kids, he, too, was persistent and independent-minded.

certain components in the life of the child. These variables are an open environment, the active use of creative skills, a result of previous knowledge, a disciplined use of technique, and an association with artists.<sup>29</sup> She explained that an open environment is one where children are encouraged to express their own ideas and emotions and where they feel psychologically secure.<sup>30</sup> It is neither an environment dominated by an authoritarian teacher, nor a wholly permissive environment without any structure. The learning environment must provide a framework within which the child learns, and just as there is time for free expression, there must also be time when the results of the child's labours are subjected to critical examination. Whether one is considering

the arts or the sciences, active use of creative skills is vital for developing creativity. As Arnheim has put it, "Vision is not mere passive reception. It is an eminently active occupation."<sup>31</sup>

Creativity also requires a prior knowledge of content or subject matter and technique. Paraphrasing Pasteur, Bruner wrote, "Discovery favours the well-prepared mind."<sup>32</sup> Equally, the disciplined, systematic use of technique is essential for the development of the ability to create. While one should not be technique-bound, carelessness or incompetence in the application of technique diminishes the quality of one's work, Finally, opportunity to work with creative persons provides children with flesh-and-blood role models, who can also provide useful feedback to the children for their ideas and labours.

Pagano provided several guidelines for creativity-inducing teaching methodology (applicable equally at school, home and possibly at work also).

- Active involvement of the learner
- Positive, 'democratic' environment (neither anarchy nor regimentation)
- Ego-building behaviours (praise, acceptance, understanding for innovative ideas or efforts)
- New learning based upon the already known
- Learning strategies and experiences consistent with the child's level of development
- Open learning environment with opportunities for play
- Encouragement to curiosity and experimentation
- Some open-ended activities not tied to grades and not tightly structured
- Opportunities for social interaction
- Use of a creative teaching approach that emphasizes self-discovery and divergent thinking
- Opportunities for children to interact with creative people.

As important as a creative teaching methodology is a creative culture among teachers. In a study by Otte, an attempt was made to identify from teachers and principals the factors that foster or inhibit creativity in teaching.<sup>33</sup> The teachers and the principals agreed on the following creativity fostering factors.

- Availability of superior teachers (role models) for observation by other teachers
- Small class
- Flexible daily schedule
- Freedom from conformity

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- Help in preparing teaching aids
- Ample instructional space
- Careful planning of lessons
- Principal's skill in releasing the creative potential of teachers
- Empathy and rapport
- Principal's pro-originality attitude
- Departure from routine
- Adoption of creativity as a basic philosophy of the school.

In other words, a pro-creativity leadership at the school level, availability of creative role models, proper planning without slavish adherence to procedures, and adequate facilities may foster a creative climate at school.

The factors that, by common agreement, inhibited creativity were as follows.

- Teacher's fear of authority
- Discouragement to experimentation
- Negative attitudes
- Over-emphasis on textbook coverage and on specific teaching methods
- Restrictive administrative practices

In other words, a rigid, authoritarian, and restrictive school environment may effectively block the teacher's creativity and the creativity of the students.

A good deal of research on classroom nurturance of creativity by Torrance suggests that certain principles of teacher behaviour can be very helpful in increasing the creativity of studdents.<sup>34</sup> His most important principle is that the teacher should show respect for unusual questions. For example, a child asked the teacher, "Where does the water on the black-board go?" The question was asked after the board had been washed. Instead of answering the question, the teacher returned the question to the class.

One child thought that the water got soaked into the blackboard, another that it went into the air. The teacher suggested that they all find out what happens. There ensued a discussion of evaporation, involving heat, air, etc. The class fanned a wet blackboard and saw evaporation take place more rapidly. This, in turn, led to a study of water, clouds, rain, fog, etc. Thus, to show respect for unusual questions by students is to use such questions to spearhead a voyage of discovery.

Other principles suggested by Torrance are as follows.

- Be respectful towards imaginative unusual ideas
- Show pupils that their ideas have value.
- Occasionally let pupils do something for practice without the threat of evaluation
- Tie in evaluation with causes and consequences, that is, while praising or punishing, emphasize the reasons for it rather than simply deliver summary judgements.

The principles Torrance enunciates for the classroom may well be equally relevant at home and at work.

In a study of 50-odd Indian innovative professionals (writers, doctors, managers, scientists, educationists, etc.), I found some aspects of their school environments to be particularly critical for later career and work choices. For instance, professionals educated in schools which emphasized the importance of creators and innovators as role models, whose principals or influential teachers were themselves committed to creativity and to encouraging it in their students, and where reasonable facilities were provided to students to pursue 'wild' ideas, tended later in life to gravitate to careers and work environments where creativity and innovation were honoured.

# **ADULT ENVIRONMENTS**

### **Social Environment**

Decades ago, Abram Kardiner, an anthropologist, proposed the notion of basic personality that members of a society share because of similar childhood frustrations and gratifications and similar childhood upbringing.<sup>35</sup> Kardiner also proposed that this basic personality in turn moulds the society's various institutions. Thus there is mutual reinforcement of basic personality and the character of the institutions of that society.

However, in contemporary liberal societies, we see huge variations in the personalities of their members. There are several reasons for this. First, modern societies consist of numerous niches that arise because of such differences as religion, language, region, occupation, economic class, race, caste, age, hobby, etc. Hence, a good part of the variation in personality is accounted for by the differences in the social niches people belong to. Then there are genetic differences and differences in family cultures. Most important, perhaps, are differences because of personal choices. Daughters of the same family may choose entirely different careers, husbands, and lifestyles. One's social environment is, therefore, partly a matter of birth (over which one has no control) and partly a matter of choice. A diagnosis of one's environment–how creativogenic it

is-can help one make a better choice, and offset some of the disadvantages, if any, of birth-related social influences.

What kind of social environment is creativogenic? Various researches provide clues.

Because humans are social animals, social cues can strongly influence the kind of creativity that is evoked. Some Australian research indicates that when subjects in an experiment, after engaged in problem solving for a while, were asked to produce original solutions rather than simply many solutions to given problems, they tended to provide less copious but more original solutions.<sup>36</sup> Similarly, several American studies have found that task-related instructions to subjects to be creative can significantly enhance divergent thinking, and result in higher flexibility or originality.<sup>37</sup> Thus, the expectations of significant persons in our lifesapce–parents, boss, mentor, leader, authority, expert, and so forth–can elevate our creativity if the expectations are for creative behaviour (see box on *Instructed Creativity*)

Some US research indicates that divergent thinking is higher in competitive versus non-competitive situations.<sup>39</sup> Thus, the extent of competition we face as individuals in the niche

#### **Instructed Creativity**

It seems almost a contradiction that creativity can be instructed. But the evidence is fairly persuasive that instructions from a credible source can elicit creative responses.

Thomas Ward and Cynthia Sifonis report an interesting experiment in which not only did instructed creativity bear fruit, but the kinds of instructions given affected creativity.<sup>38</sup> Their subjects were 105 US college students. The task was to imagine a planet very different from the earth. Two sets of subjects were asked to imagine that the planet had many species of animals and plants, and to further imagine that they encountered a member of one of these species. They were asked to draw a member of that species and label its parts. One of the two sets was also instructed to develop a creature that was wildly different from anything on earth ('wildly different' group). The other set was considered the control group. A third set of subjects was asked to imagine something that might live on another planet, but were not explicitly told to imagine an animal. They were also told that their creation need not resemble anything living on earth ('describe' group).

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The 'wildly different' as well as the 'describe' groups outscored the control group on unusualness of attributes. The 'describe' group scored higher than the 'wildly different' group on unusualness. The reason was that while all three sets of subjects were asked to be imaginative, the control and the 'wildly different' groups were cued to imagine an animal, while the 'describe' group had no such compulsion. So they could be even more imaginative. They came up with such entities as blue blob, plant-like creature, volcano, electricity absorbing crystalline structure, bouncing battery-like creature, music responder, an invisible creature, and form changer! The researchers concluded that creative output depends on the cues one gets and the information that is available. This research suggests that if high-quality divergent thinking is needed, besides communicating expectations about it, it is useful to limit constraints at least initially.

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we operate in may shape our creativity in that niche. If one niche (say, our profession) is highly competitive, and another niche (say, our family) is non-competitive, we would tend to exhibit more creativity in the competitive niche than in the non-competitive niche. Carl Rogers once opined that social environments that foster a sense of psychological freedom and safety lead to greater existential creativity–greater openness to experience, internal locus of evaluation, and ability to play with concepts and elements.<sup>40</sup> Thus freedom of initiative in a competitive niche is a happy combination for one's creativity.

S. J. Gilbert tried to examine the social influences that shaped two outstanding Renaissance geniuses, Michelangelo and Leonardo Da Vinci.<sup>41</sup> Among the social factors that may have shaped them, Gilbert noted the following.

- Members of the families, associates, and master art teachers recognized early the creative talents of both boys.
- The values of the elite in society seemed to nurture creativity.
- The patrons of the arts, mostly merchant princes, were relatively liberal.
- Personal contact with eminent minds in various fields was an important broadening factor.
- Both had access to art workshops where they could study, obtain instruction, and practice their skills, and that too, in a city that was a great art centre.

Social scientists have been intrigued by the observation that certain periods in history seem to have a disproportionate number of geniuses, that is, individuals who left a mark on society by the force of their innovative ideas. Classical Greece, the Ming dynasty in China, the Gupta period in India, Italy during the Renaissance, Victorian England, and the contemporary United States seem to be such societies. Since genetics cannot explain why a society has (in proportion to the population) more geniuses at one time than another, or more geniuses than another racially similar society, the reasons are likely to be sociological. Reviewing the work of a number of researchers, John Gowan and Meredith Olson conclude that three socio-psychological processes are likely to be central to the production of creative geniuses.<sup>42</sup>

- 1. "The potential genius must have access to numerous role models very early in life." In other words, the bright child must be exposed to the lives and works of geniuses. Dean Simonton's study of 696 Western musical composers of the 15<sup>th</sup> century and onwards indicated that the larger the availability of role models, the earlier the composer tended to become productive.<sup>43</sup> However, this finding did not hold for thinkers.<sup>44</sup> The conflicting findings suggest that in 'applied' or growing fields in which many niches can be created in response to society's needs, such as music, the availability of role models facilitates individual creativity. In older, more basic or settled fields, such as philosophy, where progress is through credible refutation of the vast amount of earlier work, too many role models early in life may breed confusion rather than creativity.
- 2. "Exposure to cultural diversity also seems to nourish the preconscious youth." Exposure to diverse, even conflicting perspectives, and de-emphasis on *the* solutions to problems (the trait of most formal education throughout the ages), increase the probability that the bright mind will become innovative.
- 3. Social and political ferment-as in periods preceding political revolutions or during independence struggles-during the formative years of bright minds seems to increase the probability that these bright minds will blossom into innovators, especially in social philosophy. At the same time, political instability marked by frequent coups, seems to breed a fatalistic attitude that dampens the spirit of original enquiry.<sup>45</sup>

Sister Dye enquired into the climate which helps creative potential to result into creative outputs.<sup>46</sup> She examined six creative periods in European history, and came to the conclusion that a democratic climate in which freedom of action and thought was counter-balanced by social order was better for creativity than either an authoritarian or a laissez-faire (permissive) climate. Juxtaposing her findings with the point made by Gowan and Olson, it would seem that social order facilitates creativity when there is a democratic climate, while social disorder may facilitate 'protest' creativity when the climate is authoritarian.

#### To Summarize

Culture and society, especially the social niche or niches in which we operate, can affect our creativity. The expectations for our creativity of highly regarded individuals, the competition we face, the norms favouring autonomous behaviour and respect for individual initiatives, opportunity for interactions with creative 'masters', availability of creative role models, opportunities for creative work and demand for one's creative outputs – all of these can enhance our creativity. Also, a heady, opportunity-rich period affects creativity positively but its effects may be uneven as between advantaged social classes. The best combination may be a turbulent epoch and being a member of a relatively advantaged class or community. The world over we have a turbulent epoch. The social challenge is to gild not just the lucky few but the masses with the magic of creativity.

#### Adult Learning and Work Environment

One's learning environment at college or university may importantly inhibit or facilitate one's creativity. As Paul Samuelson, the Nobel laureate economist reportedly put it, "I can tell you how to get a Nobel prize... have great teachers."<sup>47</sup> In one American study, several hundred creative professionals rated the college teaching styles that influenced students' creativity.<sup>48</sup> The creative classroom learning environment at college was the one where students were treated as individuals and were encouraged to be independent; the teacher was dynamic and interesting and served as a model; the teacher interacted with students outside the class; the teacher indicated that excellence was expected and, indeed, would be achieved; and the student's creative work was rewarded. The creativity inhibiting environment was where ideas and creativity were discouraged, and where the instructor was hypercritical, dogmatic, and rigid, lacked enthusiasm, emphasized rote learning, had not kept up with the field, had narrow interests, or was generally not available outside the class for interaction. In another American study, conformist, religious, bureaucratic colleges were found to be less innovative than liberal, 'open' colleges.<sup>49</sup> Some other US research suggests that higher education environments that encourage independence, risk taking, and intrinsic motivation may be most conducive to creativity.<sup>50</sup>

The work environment, too, can suppress or evoke one's creativity. In a Nigerian study, 50 senior managers of governmental and public sector corporations listed the factors that had inhibited their creative performance in the organizations. The most commonly agreed upon factors were unsupportive leaders and colleagues; rigid adherence to rules; no reward for, and non-recognition of, creativity; risk avoidance and defensiveness at work; resource shortage for attempting innovations; over centralization and over emphasis on hierarchy, etc.<sup>51</sup> Calvin Taylor found in an American research lab (of all places), that there was promotion slowdown for those who had contributed above average ideas that had been accepted and rewarded! If a scientist wrote a paper for publication, he was likely to get a rating from his superior for below average

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cooperation.<sup>52</sup> Organizations can also spur the creativity of their staff. In a division of the General Motors Corporation, a selected group of employees with a record for making many suggestions, and another group with a low suggestion record, were given a 10 week creativity training programme consisting of weekly one hour sessions.<sup>53</sup> After the training, both groups showed increases in the number of submitted as well as accepted suggestions, and in the amount of money earned in awards for accepted suggestions. In these they out-performed the control group. Thus, encouragement to creativity, and training in creativity at work, can increase creativity in the work situation.

Challenging tasks and supportive supervision can enhance creativity. In a US study of over 170 employees of two plants, those employees with creativity aptitude produced the most creative work when they were given complex, challenging jobs, and had supervisors who were supportive and not prone to too much control.<sup>54</sup>

#### To Summarize

Research suggests a large number of stimulants to creativity in the work environment, which include the following.  $^{55}$ 

- 1. Challenging tasks or missions
- 2. Healthy interpersonal relations in one's work group; support of colleagues for new ideas
- 3. Freedom to decide how to perform the tasks, and needed autonomy for taking decisions
- 4. A relatively decentralized, non-hierarchical organizational structure
- 5. An open, supportive boss who encourages new ideas
- 6. Availability of materials and equipments needed for innovation
- 7. Needed training for developing creative potential and for facilitating innovation
- 8. Optimal work pressure; neither too much nor too little. Ideally, the pressure should emanate from the challenge in the job.

# **ENVIRONMENTAL STIMULANTS OF CREATIVITY**

Across the formative and adult creativogenic environments that we have examined, the following characteristics seem to be strong creativity stimulants.

## I. Stimulation

A stimulating environment arouses creativity. This is the environment in which there is always something *new* to do, experience, or know, and where one is frequently called upon to respond to new tasks and challenges. A monotonous environment or task dampens creativity. In one study, groups of female collegians were administered creativity tests in varying conditions of visual and kinesthetic stimulation.<sup>56</sup> As compared to the control group that did not receive any such stimulation, the experimental groups recorded increased scores on creativity. In another study, one group was given a monotonous environment; another, a stimulating environment; and a third the usual environment. Subsequently, stories based on pictures obtained from the members of these groups were analysed.<sup>57</sup> These indicated that the stimulating environment group outscored the monotonous environment group on the novelty of imagery (although it was outscored on the desire for novelty). In still another study, a sample of artists were shown slides. One group was shown slides superimposed upon one another. These, presumably, were more intriguing. The drawings of the stimulated group done after the slide show showed greater creativity.<sup>58</sup> There may be an interesting twist, however, to environmental stimulation. In one study, only the more creative children performed more creatively in a cue-rich environment, not the less creative children.<sup>59</sup> It is not enough to have a stimulating environment; there must be something to stimulate too! Finally, competition that poses challenges increases divergent thinking.60

#### 2. Nurturance

An environment that encourages and rewards creativity, innovation, and experimentation stimulates creativity. One that ignores creative efforts or penalizes them, dampens it. In an experiment with four-year-old children, Savoca found that children who were rewarded with a toy for being creative tended to exhibit greater creativity than children that were not rewarded.<sup>61</sup> Students who were given an incentive to increase their creativity scores on a retest showed higher scores than a group that was not given any incentive.<sup>62</sup> Thus, concrete rewards can stimulate creativity, even though the poet T.S. Eliot thought that a Nobel Prize would destroy his creativity.

Creativity researchers have encountered something of a paradox. Studies show that evaluation of the product of creative activity seems to affect creativity adversely, while reward for creativity seems to enhance it.<sup>63</sup> Teresa Amabile, working with 95 female college students involved in an art activity, found that while the threat of evaluation generally dampens creativity, it does not do so if it is accompanied by explicit instructions on how to exhibit creativity in one's work. Elsewhere, she has argued that in open-ended tasks, evaluation may undermine creativity but in structured tasks it may enhance it.<sup>64</sup> She has also recommended 'intrinsic' rewards rather than monetary or 'extrinsic' rewards for stimulating 'real' creativity. As she puts it, "Intrinsic motivation is conducive to creativity, but extrinsic motivation is detrimental... When people are primarily

motivated to do some creative activity by their own interest in and enjoyment of that activity, they may be more creative than they are when primarily motivated by some goal imposed on them by others."<sup>65</sup>

## 3. Optimal Tension

An environment, which does not induce defensiveness and fearfulness by premature criticism or evaluation, encourages creativity. On the other hand, a tension inducing environment in which any new idea is quickly dismissed as half-baked, stupid, impractical, or wrong, discourages creativity. Indeed, there is evidence that a low tension, relatively relaxed environment encourages creativity. Under hypnosis, a sample of female college students scored higher on a test of originality than non-hypnotized subjects.<sup>66</sup> It was hypothesized that defensiveness would be lower under hypnosis. Studies of the effectiveness of brainstorming also attribute the much greater production of ideas (fluency) of brainstorming groups as compared to groups that evaluate their ideas to the deferred evaluation prnciple.<sup>67</sup> Hadley found however that moderate anxiety helps creativity; no anxiety or high levels of anxiety tend to depress it.<sup>68</sup> In general, therefore, creativity tends to be greater when people involved in a task are relaxed but alert, and not feeling defensive.

### 4. Constructive Feedback

An environment in which there are opportunities for feedback and tough but constructive evaluation of ways of approaching complex problems and outputs of creative efforts, encourages creativity. One in which there is laissez-faire dampens creativity, or makes it trivial. There may, however, be some difference here depending on whether the person receiving feedback has a high need for autonomy or not. In one study, it was found that freedom-oriented groups tended to benefit most from a feedback that encouraged members to look at the creative work of each other without evaluating it and to continue to hitch-hike on each other's ideas. On the other hand, groups in which members had a high need to be given directions tended to benefit most when the feedback was evaluative, that is, when the members of the group were asked to evaluate each other's products in the light of examples of good performance (models) that were provided to the group.<sup>69</sup>

### 5. Learning Opportunities

An environment that provides opportunities for rigorous technical training, preferably at the hands of creative tutors, stimulates creativity. One where training is sloppily provided, or where the tutors or mentors are mediocre, dampens creativity. In a study of 92 American Nobel

laureates, over half worked as students or collaborators of other Nobel laureates, presumably in some of the best American institutions. $^{70}$ 

## 6. Diversity of Viewpoints

An environment rich in diversity of views and intellectual ferment encourages creativity. One, which emphasizes uniformity and conformity dampens creativity.

## 7. Freedom with Accountability for Excellence

An environment that provides freedom of thought and action but, equally demands responsibility, accountability, and effective performance, encourages creativity. Both freedom without responsibility and an authoritarian environment are equally destructive of creativity. In a classroom experiment, for example, it was found that students who were allowed freedom of expression in written composition showed greater increase on tests of creativity than students who were taught by the usual directive method.<sup>71</sup> Other experiments have shown that the self-discovery method of learning produces a greater variety of responses and greater creativity than the authoritarian or rote methods.<sup>72</sup>

## 8. Creators as Role Models

An environment in which pioneers, innovators, creators, and transformers of the status quo such as reformers and change agents are looked up to as models, stimulates creativity. One which extols duty-bound conformists may nurture morality, but discourages creativity.

# 9. Facilities for Experimentation

An environment that provides reasonable physical or social facilities for experimentation, practice, trial of innovative ideas, etc. encourages creativity. Too great a physical deprivation, and possibly too little as well, inhibits creativity.

# **10.** Norms of Boss Figures

An environment in which admired or loved high-status individuals (parents, teachers, bosses, social leaders, etc.) hold norms favouring creativity, and communicate expectations to the individual of a creative effort by the latter, stimulates creativity. An environment in which admired high-status persons hold anti-innovation norms, or are indifferent to creativity, or fail to communicate their expectation of creative effort to the individual, or communicate the

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expectation of a conformist response, discourages creativity. In an experiment, it was found that teachers who were trained through audio-visual techniques to treat pupil's questions and unusual ideas with respect, and to encourage self-initiated learning, experimentation, etc., were not only able to do so in actual classroom situations, but were able to stimulate significantly more original thinking in their pupils.<sup>73</sup> In small groups in which disagreement in reaching a solution was engineered, whether innovative solutions were reached or not tended to depend upon whether the group leader saw subordinates as ideas men or trouble makers.<sup>74</sup> In other words, the leader's acceptance of divergent ideas tended to lead to more innovative solutions by the group. Thus, if the leader figure favours creativity, he or she will tend to evoke greater creativity in subordinates.

In some research I did on 160 Indian professionals, these 10 dimensions of their environment were correlated with the creativity motivation of these professionals.<sup>75</sup> The strongest correlations were with environmental stimulation, nurturance and reward for creativity, and availability of constructive feedback on one's innovative efforts; the weakest were with optimal tension and freedom coupled with accountability.

Figure 14.1 gives a bird's eyeview of the types and traits of the creativogenic environment and how these shape our creativity.

# SELF-DIAGNOSIS OF CREATIVOGENIC ENVIRONMENT

The first step in changing your environment to make it more congenial to creativity is to diagnose it. The principles of a creativity-inducing environment, summarized in the previous section, have been incorporated into a set of scales in the instrument titled *My Environment* (see Appendix 14.1). Each set of 10 scales covers a particular facet of your environment. The environments considered are your home environment as a child, your school environment, your present social environment encompassing your family and friends, and your present work environment (or your present study environment if you are still a student). After completing My Environment, summarize your scores in the table given at the end of the instrument. If your total score is less than 80, you clearly are in an environment inimical to creativity. You need to identify the facet(s) of your environment that are particularly non-congenial to creativity. Look at the aggregate score for each facet of environment. Look closely at those facets where your score is less than 40. In these facets, look closely at scales where the score is 20 or less. You need to brainstorm on how to change the situations depicted in these scales to those more favourable to creativity. Before doing so, a simple force field analysis may help.<sup>76</sup> In a force field analysis you identify forces that are favouring the current situation. You also identify the factors that oppose the current situation. If you wish to change the situation, you brainstorm on how to weaken the forces opposing the





change in the desired direction, and also brainstorm on how to strengthen or consolidate the forces favouring the change.

# MAKING YOUR ENVIRONMENT MORE CREATIVOGENIC

Many people complain that their environment is hostile to creativity and that they are helpless victims of their environment. But our environment is not immutable like the Pole Star. To quite an extent, the environment is what we choose it to be.

Modifying a hostile environment is important because such an environment can sharply reduce our potential creativity. After all, had Einstein been born among the pygmies of the Kalahari desert, he could hardly have revolutionized theoretical physics; many a bright woman withers unknown in the labyrinth of household chores. One needs some minimum freedom of action, and some minimal support (or at least lack of determined opposition) to be able to function creatively.

Creativity is a tender plant. It is difficult to grow it in an environment in which "We've never done this before," "It won't work", " It is not done", "We haven't the time", "We are not yet ready for it", "This is all right in theory but it isn't practical", are the stock phrases of people with power. The force of conservatism runs strong in many an office, many a family, and many a community, and so does the fear of the strange, the new, the untried. But even in such a climate, adroit action can provide one the freedom to be creative. Let us see what can be done to make a hostile environment more congenial to creativity.<sup>77</sup>

### Coalition

In a hostile environment, a little support goes a long way. Thus, identifying powerful persons at home or at work or in society who are receptive to creative and new ideas, can be very helpful. If they can be convinced about the potential of our ideas, they can help us promote better ideas. So, try and get hold of creative godfathers and friends.

#### **Making Oneself Attractive to Others**

Serviceability wins friends. If we can be helpful to others, especially those with power or influence, our credibility with them may be established. With that is likely to come greater receptivity to our ideas. Articulating the commonly shared values or goals of the group one is in, also makes one acceptable. Competent performance has a similar effect.

#### Marketing of Creative Ideas

It is useful to bear in mind that ideas are accepted or rejected not just on the basis of their intrinsic goodness. More often, they are accepted or rejected by others on the basis of whether they are likely to help or hinder them in meeting their personal goals. If an idea can be shown to help another feel more secure, or helps a person get ahead or gets the person prominence or a thrill, it is more likely to be accepted than a recitation of the idea's technical or moral advantages. Also, others are more likely to accept an idea they feel they have helped to create or refine than one that is clearly alien in its origin. Besides, if people perceive a crisis, and if the idea is shown to be the answer to the crisis, it is more likely to be accepted than if there is no emergency or the idea is not seen as the answer to an emergency. Timing in presenting ideas is critical in a hostile environment. A polished presentation, liberal sharing of credit for the idea, endorsement of the idea by the powerful, visualization of the many indirect benefits of the idea besides the direct ones, a new twist that captures attention, and solid research on the costs and benefits of the idea are likely to win many supporters for an idea and also its progenitor. So, create stakeholders in your creative ideas.

#### Choices

The environment alters with every choice one makes concerning friends, spouse, job, hobbies, or residence. Our social environment consists of the people whose opinion we value and the people with whom we commonly interact. Conformist friends can squelch creativity effectively by snide comments just as creative friends can encourage it with ideas, resources, and praise. The choice of one's occupation, and the organization one wants to work in, are also major influencers of one's environment. An organization with a climate of innovation can be very worthwhile even if a job in it means less pay or a lower position than in another organization without a climate of innovation. Progressive, but under-managed, undermanned, vulnerable, and/or rapidly growing organizations are more likely to be receptive to innovations than bureaucratic or professionally managed, overmanned, monopolistic, and/or slow growth organizations. The choice of one's hobbies brings in its train a whole lot of friendships and acquaintances, and this can be harnessed to create a more creativity-supportive environment. Creativity, rather than the splendour of looks, may be sought in a prospective spouse. Even if one is already married, and the spouse is not creative, much can be done to neutralize his/her opposition to creativity by paying attention to the points in the section above on the marketing of ideas! If you have children, the school you choose for your children can be quite important. If the school emphasises creativity and a spirit of exploration, not only will your children want to do interesting things, but you may meet many like-minded parents of your children's friends, that is, parents who value creativity. So, choose creativity over conformity in choice-making situations.

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# CONCLUDING COMMENTS

As adults, we may think that childhood and early schooling are far away in time. We would be mistaken. These can recur repeatedly. Change your lifestyle, life philosophy, goals, career, job, or locale and you are back to a sort of childhood, in which you may recapture the wonder and the learning. As Dylan Thomas put it, time lets you hail and climb golden in the heydays of his eyes. The environment is not some castle in which we are incarcerated. It is a vast landscape for us to choose our freedom and our constraints in, and create our distinctive nests.

# Quiz

Identify the pros and cons of the following statements.

One's home environment affects one's creativity more than one's work or social environment.
 The scars of childhood can never be overcome later on in life.
 A professionally managed organization is more likely to offer an atmosphere congenial to creativity than an entrepreneurial organization that aims high but has a shortage of good managers.
 A permissive school is best from the point of view of fostering creativity in children.

5.

2.

For making one's social environment more congenial to creativity, it is best to cultivate the friendship of unconventional artists.

# MENTAL GYM

1. List four arresting, paradoxical, or poetic captions for each of your childhood, school, current social and work (or study) environment

Childhood Environment School Environment				
Social Environment	Work or Study Environment			
	•••••			
List the attributes of any aspect of your environment brainstorm on how to improve matters with respect	nt that you find most frustrating. Now t to each of these attributes.			

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3. Supposing you are a fresh management school graduate and get a job as an assistant to the controller of an entrepreneurial beverages company. You are very anxious to introduce modern systems of costing, and this involves working not only with your boss but also with executives in other departments. You find that the company's costing system is not very

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scientific, and nobody takes costing seriously enough. You also find that senior managers are not very receptive to too quick a change. The company, however, is poised for expansion, and you feel that changes need to be made quickly. You feel that while your own boss is competent, he is rather cautious. The CEO, however, is quite dynamic, though mostly unavailable. You find a like-minded 'progressive', the head of the planning department.

Outline the steps by which you will make this organization more receptive to an appropriate costing system.

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4. List at least five poetic titles about the environment of a prisoner.

..........

- 5. List 10 ways in which a housewife in a traditional family can make her environment more congenial to creativity.

6. Brainstorm on how to make the environment of the innmates of a blind people's institution more creative.

..........

7. Become a brick in the decaying wall of an old house. How do you experience your environment?

8. Write a story titled, Rainbow Over a Slum.

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# **ANNEXURE 14.1**

## **My Environment**

Please circle the appropriate number from 0 to 10 in each of the following scales. For each scale, if you strongly agree with the statement on the *left*, you should circle 0. If you agree with this statement, but have reservations, you should circle 2. If you strongly agree with the statement on the *right*, please circle 10. If you basically agree with it but feel it is too strong, circle 8. If your opinion is *midway* between the two statements, circle 4 or 6 as per choice. Remember you must circle only *one* number in each scale.

A. Your Childhood at Home			
1.	Very <i>monotonous;</i> nothing particularly interesting to do	0246810	Very <i>stimulating</i> ; constantly playing new games, making new friends, visiting new places, meeting interest- ing persons, getting to learn new things, etc.
2.	<i>Nobody took any interest</i> in any of my creative efforts; pretty much left alone to my own devices	0 2 4 6 8 10	Was handsomely <i>rewarded</i> or praised and <i>encouraged</i> for being <i>innovative</i> or for having <i>creative ideas</i>
3.	I was <i>immediately criticized</i> or punished severely for doing or saying anything new or controver- sial.	0246810	No personal criticism for doing or saying anything novel or controver- sial; disagreements if any were expressed after a patient hearing
4.	Family members or other elders <i>never discussed</i> my creative efforts with me in any <i>detail</i> .	0246810	Family members or other elders gave <i>detailed constructive feedback</i> on my creations and tried to clarify to me underlying principles.

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5.	I had <i>no opportunity to learn know-how</i> <i>and techniques</i> relevant to my hobbies or interests from anyone.	0246810	I was given <i>full opportunity to learn</i> <i>know-how and techniques</i> relevant to my hobbies or interests from capable and innovative experts.	
6.	At home, everybody expressed just <i>one common point of view</i> or believed in just one religious or political ideology.	0246810	At home, people expressed many <i>different points of view</i> and were encouraged to hold differing positions.	
7.	<i>Nobody bothered</i> even if I performed badly in activities that interested me.	0 2 4 6 8 10	Freedom was given to me to pursue my interests but <i>no excuses were toler-</i> <i>ated</i> for <i>shabby</i> performance.	
8.	At home, pious or <i>moralistic figures</i> were most respected.	0 2 4 6 8 10	At home, the most respected figures were <i>innovators, pioneers, reformers,</i> and <i>creators.</i>	
9.	I had virtually <i>no physical or other facilities</i> to pursue my hobbies and interests.	0 2 4 6 8 10	I was provided with <i>reasonable</i> physical and other facilities to pursue my hobbies and interests.	
10.	10. My parents/elders were quite 0246 <i>conformist</i> and in this they <i>expected me</i> to <i>follow</i> in their footsteps.		My parents/elders were strongly committed to <i>creativity</i> and <i>innova-tion</i> , and <i>inspired</i> me to become an <i>innovator</i> or a pioneer.	
в. у	Your Schooling			
1.	Very monotonous and <i>boring</i>	0 2 4 6 8 10	Highly <i>stimulating</i> and interesting; many interesting activities, much diverse and exciting learning; inter- esting interactions with teachers, interesting visitors to school, fellow students, etc.	
2.	Teachers took <i>very little interest</i> in any of my creative actions or ideas.	0 2 4 6 8 10	I was handsomely praised, <i>encou</i> <i>aged</i> , or <i>rewarded</i> for being innovativ or for having creative ideas.	

3.	I was <i>immediately</i> called names or punished by teachers or fellow students for doing or saying anything new or controversial.	0246810	No personal criticism for my doing or saying anything novel or contro- versial; criticism if any was offered after <i>patient hearing</i>
4.	Teachers or senior students <i>never discussed</i> with me my creative efforts in any detail nor provided me with a detailed feedback.	0246810	Teachers or senior students usually gave a constructive and <i>detailed feed-</i> <i>back</i> on my creations or innovations and tried to clarify underlying princi- ples.
5.	I had no <i>opportunity</i> at school to <i>learn techniques</i> and know-how relevant to my hobbies or interests.	0246810	The school provided <i>full opportunity</i> to learn techniques and know-how relevant to my hobbies or interests from <i>creative</i> teachers.
6.	At school, just <i>one 'correct' point of view</i> was emphasized. There was no encouragement to divergent views.	0246810	At school, there was a conscious effort to expose students to <i>various</i> <i>points of view</i> on issues and there were many exciting debates on issues.
7.	<i>Nobody bothered</i> even if I <i>performed</i> badly in activities that interested me.	0 2 4 6 8 10	Freedom was given to me to pursue my interests but no excuses were tolerated for shabby performance.
8.	At school, <i>moralistic</i> or pious <i>figures</i> were most respected and were held up as examples to emulate.	0 2 4 6 8 10	At school, the most respected figures were <i>innovators</i> , pioneers, reformers, and creators in various walks of life.
9.	At school, there were virtually <i>no facilities</i> to pursue my hobbies and interests.	0 2 4 6 8 10	At school, there were <i>reasonable facili-</i> <i>ties</i> to pursue almost any hobby or interest.
10.	The teachers were mostly rather <i>conformist</i> and <i>expected me</i> to uphold <i>their values</i>	0 2 4 6 8 10	The teachers were mostly strongly committed to <i>creativity</i> and <i>innova-tion</i> , and <i>inspired</i> me to become an innovator or a pioneer.

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1.	Very <i>monotonous</i> ; nothing particularly interesting occuring	0 2 4 6 8 10	Very <i>stimulating</i> ; constant stream of new activities, interesting new friends, new ideas, etc.
2.	Nobody cares a damn about any of my creative acts.	0 2 4 6 8 10	Very <i>strong encouragement</i> and praise for being innovative or for having creative ideas
3.	I am <i>immediately criticized</i> or called names for doing or saying anything novel or controversial.	0246810	No personal criticism is made for doing or saying anything novel or controversial; criticism if any is offered after a <i>patient hearing</i> by people close to me.
4.	There is <i>nobody</i> to discuss with me in <i>detail</i> any creative effort of mine.	0 2 4 6 8 10	I can count on a number of friends or relations to discuss with me in <i>detail</i> any creative effort of mine.
5.	My circumstances <i>do not permit</i> me to <i>learn techniques</i> and know-how relevant to my hobbies or interests.	0246810	My circumstances afford me nearly unlimited opportunities to learn tech- niques and know-how relevant to my hobbies or interests, and that too from creative experts.
6.	People I know intimately by and large all hold <i>similar views</i> on most issues.	0246810	Most of the people I know intimately have quite <i>divergent views</i> on many issues and they express them with a lot of <i>conviction</i> .
7.	<i>Nobody</i> close to me <i>cares</i> even if I perform badly in activities that interest me.	0246810	While <i>nobody</i> comes in my way in pursuing my interests, people close to me <i>take me to task</i> if I turn in a <i>shabby performance</i> .
8.	In my social circle, pious or <i>moralistic</i> individuals are held in the highest esteem.	0 2 4 6 8 10	In my social circle, <i>pioneers</i> , innova- tors, reformers, and creators are held in the highest esteem.
9.	I really have no access to physical or financial <i>facilities</i> to pursue my hobbies or interests.	0246810	I have access to <i>reasonable</i> physical and financial facilities to pursue any and all of my hobbies and interests.

10.	Prominent figures in my social circle	0246810	Prominent figures in my social circle
	are quite <i>conformist</i> in their outlook		are mostly committed to creativity and
	and <i>expect me</i> to conform to their		innovation, and inspire me to be an
	values and norms.		innovator or a <i>pioneer</i> .

## D. Your Work/Study Environment

If you are *studying*, respond to the following items vis-à-vis the *institution* you are studying in. If you are *working* in an organization either for remuneration or otherwise, or intimately connected with one, respond to the items vis-à-vis this organization. If you are doing both, pick one of the two entities that is more important to you.

1.	. Very <i>monotonous</i> ; nothing particularly interesting to do		Very <i>stimulating</i> , constantly getting interesting assignments, meeting interesting people, coming across new ideas, etc.
2.	<i>Nobody</i> takes any <i>interest</i> in any of my creative efforts.	0246810	I am greatly <i>encouraged</i> and rewarded for being innovative or creative.
3.	I am likely to be <i>immediately criticized</i> or <i>punished</i> in some way for saying or doing anything novel or controversial.	0246810	There is <i>never</i> any <i>personal criticism</i> ; criticism if any is always after a <i>patient hearing</i> to my novel, off-beat, or innovative ideas.
4.	<i>Nobody</i> here would bother to give (or could give) me <i>constructive</i> and detailed feedback on any innovative effort of mine.	0246810	Here I can certainly expect <i>well-informed constructive and detailed feed-back</i> on my innovative efforts from <i>knowledgeable</i> persons.
5.	Here I have <i>no opportunity to learn techniques</i> and know-how relevant to the assignments or tasks of interest to me.	0246810	I have nearly <i>unlimited opportunity</i> to learn all the <i>techniques</i> and know-how relevant to my work/study from <i>innovative instructors/trainers/staff</i> .
6.	Here there is no <i>freedom</i> to hold beliefs or positions different from the official line or philosophy of the bosses.	0246810	Here people hold <i>strong and diverse</i> positions on various issues and articulate them forcefully.

7.	<i>Nobody</i> here <i>bothers</i> even if I <i>perform</i> badly on various tasks of interest to me.	0246810	Here I have <i>freedom</i> to pursue my work-related interests but <i>no excuses</i> for <i>shabby performance</i> are <i>tolerated</i> .
8.	Here the greatest respect is given to <i>moralistic, obedient</i> or <i>dutiful</i> persons.	0 2 4 6 8 10	Here the greatest respect is given to persons who are successful <i>pioneers</i> , <i>innovators</i> , change agents, or <i>creators</i> .
9.	Here I have <i>no access to physical and financial facilities</i> to pursue any work-related interests or to develop 'wild' ideas.	0246810	There are <i>reasonable</i> physical and financial <i>facilities</i> here to pursue my work-related interests or 'wild' ideas.
10.	The boss figures here are quite conform- ist and expect me also to conform strictly to the organization's rules, norms and procedures.	0246810	The <i>boss figures</i> here are strongly committed to <i>creativity</i> and <i>innovation</i> and <i>inspire</i> me to be creative and innovative.

# Scoring

Transfer your ratings from *Your Environment* to the table below. For this purpose, multiply the number you have circled in each scale by 10 to convert into % scores.

		Formative Environment		Adult Env	Overall Trait			
		1 Childhood environment at home	2 School environment	3 Present social environment	4 Present work/study environment	5 Total across the four columns and divide by 4		
1.	Degree of stimulation							
2.	Encouragement and reward to my creativity							
3.	Optimal tension							
4.	Availability of detailed constructive feedback on my creative efforts							
5.	Opportunity to master know-how, tech- niques relevant to my interests							
6.	Availability of diverse view- points and freedom to hold any divergent view							

# Table of Your Scores on How Creativogenic Your Environment Is

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		Facets of Environment				
		Formative E	Invironment	Adult Env	Overall Trait	
		1 Childhood environment at home	2 School environment	3 Present social environment	4 Present work/study environment	5 Total across the four columns and divide by 4
7.	Freedom of activity coupled with penalty for shabby performance					
8.	Pioneers, crea- tors, change agents, and innovators as role models					
9.	Availability of physical and financial facili- ties to pursue interests and hobbies					
10.	Commitment of boss figures to creativity and innovation and their communi- cation of expec- tations to me					

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			Fa	cets of Environm	ent	
		Formative E	Environment	Adult Env	vironment	Overall Trait
11.	Total for facet	1 Childhood environment at home	2 School environment	3 Present social environment	4 Present work/study environment	5 Total across the four columns and divide by 4
	of environ- ment (sum scores for 1 to 10) and divide by 10					

#### Interpretation

Take a look at column 5 in the table. If your score is below 50% for any trait of the environment, you need to go into high gear and try to change that trait. Do the exercise given below and develop some concrete ideas and implement them.

It is a good idea to fill out *Your Environment* periodically until your scores for all the 10 traits stabilize at over 50%.

The following exercise is worth doing to make your environment more creativogenic.

#### A. Your Childhood

If your childhood, at home or at school, was scarred by repression and lack of encouragement to creative pursuits, what can you do to get rid of the fears, inhibitions, and obsessions that frequently result from such a childhood? (Have you talked about your most painful childhood memories to a mentor or someone you trust?)

#### B. Your Present Social Environment (Home, Family, Friends)

Is there much freedom of action– and belief – in your family and in your friends circle? Do you, as a significant member of your family and friends circle, encourage freedom of thought and action in the others? Is there a reasonable balance between discipline and freedom? Is there a strong encouragement to creativity, originality, experimentation, and so forth?

What can be done to make the climate in your social environment more congenial to your creativity? (Consider brainstorming sessions, inviting creative persons home, having creative friends, joining creative clubs or associations, etc.)

#### C. Your Work/Study Environment

Do you have much autonomy at work (or place of study if you are a student)? Is there much encouragement to you to try out new ways, take initiatives, experiment, etc.?

What can you do to make your work or study environment more congenial to creativity? (Consider tasks, relationship, alternative occupations, etc.)

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# 15

# Techniques of Creative Problem Solving



# **PRINCIPLES AND TECHNIQUES FOR CHURNING UP CREATIVE IDEAS**

Although creative achievement is surely much more than just a novel idea, equally surely, novel ideas are the accelerators of creativity. In the 1950s and 1960s, only a few techniques and their variants for producing novel ideas and solutions were popular. These included brainstorming, attributes grafting, morphological analysis, questions checklist, and synectics. By the late 1990s, around 172 had been identified by Gerald Smith.<sup>1</sup> Many of these were derivatives of the earlier techniques. But some had novel features. For instance, in one technique assumptions are made for

a particular problem that are contrary to the assumptions with which people would generally approach the particular problem. In another technique, known as Napoleon, the problem is attacked from the viewpoint of different agents. In one of de Bono's techniques, variables in a situation are extremized—what, for instance, would need to be done to get to office at the speed of light. In still another technique, the alternatives generated for a problem situation are all

They know enough who know how to learn Henry Adams sought to be accommodated or integrated into the solution. In still another technique, non-logical, unrelated stimuli are introduced into the problem-solving task. Another one involves idea generation contests. Then there is a technique in which the problem solver is made to experience the problem situation through simulation, role play or otherwise. In another interesting technique, synonyms are sought for the words of the problem definition for exploring their implications. And in a technique called Lion's Den, one group proposes ideas and another group criticizes them in a dialectical process so as to generate interesting fusions.

Smith not only listed the 172 techniques, he also tried to identify the 'principles' or underlying devices used in each technique. As he put it, "A profusion of creativity techniques that have been proposed and used is based on a much smaller set of active ingredients, devices that promote idea generation."<sup>2</sup> He identified some 50 idea generating devices, and he classified them into 15 different categories. Some of these are worth noting.

- 1. Analytical devices aimed at a fine-grained analysis of the problem situation This is quite a useful device. In a research on creative artists it was found that those artists who did relatively greater critical analysis before and during their work were more successful in their careers than those whose analysis was perfunctory.<sup>3</sup> Analytical devices include decomposition of a complex problem into parts, and restatement of a concrete problem in somewhat abstract or general terms. How do we fight recurring famines in sub-Saharan Africa? By decomposing the problems into smaller, more tractable problems like how do we ensure better water supply, better farming methods like dry farming, better finance to the farmers, better mix of staples and cash crops, greater social forestry, better information about government aid schemes, better local administration of such schemes, higher priority to farming in national budgets, land reform, etc.
- 2. Search mechanisms aimed at retrieving relevant information from memory, for example through seeking associations of the problem situation's terms For example, if crowding is a problem, crowding may remind one of tropical jungle, jungle may remind one of trees growing tall for sunlight, and this in turn may remind one of multiple paths and multiple-level platforms at points of congestion for reducing crowding. Other search mechanisms are seeking out memories of relevant past experiences, thinking of analogies of the problem situation, etc. Indeed, there is some evidence that such associational abilities are correlated with measures of creative achievement.<sup>4</sup>
- Imagination-related devices like fantasying, imaging, empathising, personal identification (even with non-sentient entities) Reportedly, people at Gillette, a toiletry major, developed a new shampoo in part by imagining themselves to be human hairs<sup>5</sup> (see box on *Imagery Training*).

- 4. Habit-breaking devices, such as challenging one's assumptions, seeing what happens by employing contrary assumptions, seeing the problem from radically different perspective, etc. This is useful in problem situations in which the problem-solvers have got into a groove. As research indicates, a situation-induced mindset must be overcome for creative insights to occur.<sup>6</sup> Most of us parents assume that we know best what food is good for our children. Suppose we question this assumption? Suppose we assume that given a chance children may do a much better job of finding out what food is good for them, and indeed, what food is good for their parents? The results could be startling!
- 5. Relationship-seeking devices, that is, devices that can help establish previously unsuspected relationships This could include a new way of cross-classifying data–e.g., cross-classifying mean winter temperature of regions with longevity of species living in the regions, or cross-classification of phase of the sunspot cycle with labour strikes.
- 6. **Task-related strategies** This could include breaking up a goal into smaller goals, or extremization of the goal/purpose/task, or combination of tasks or their rearrangement or contextualization. Research suggests that more options for decision making are generated when a problem's scope is increased.<sup>7</sup>
- 7. **Idea development strategies** Combining alternatives into a problem solution, finding circumstances in which the idea may work, and finding out the strengths of an idea vis-à-vis the current solution are examples. Suppose a young graduate is attracted to two quite different careers—that of an executive and that of social service. How might he be able to combine both alternatives? For instance, by starting an NGO, or taking a job as an executive of a corporate social responsibility activity.
- 8. **Interpersonal strategies** Group members stimulating each other by sharing ideas, debating issues, defining problems, etc. Brainstorming, synectics, and other group problem solving methods harness these strategies.
- 9. **Idea prompts** These may include getting ideas from novices or using checklists to generate ideas.
- 10. **Deblocking/instigative/activating idea-flow devices** These include provoking problem-solvers, such as by taunting them, imposing deadlines or 'stretch' targets on them, and designing incubation periods in which problem-solvers temporarily disengage (at the conscious level) from the problem situation to harvest later 'aha' ideas. Incubation periods can range from meditation and sleep to vigorous physical exercise and vigorous mental exercise such as solving a crossword puzzle. Idea-flow devices include setting aside obvious ideas so that problem-solvers look for

non-obvious ideas, deferring of evaluation of ideas until after the phase of the production of ideas is over (as in brainstorming), hiding the identity of problem-solvers from one another to prevent awe or prejudice from blocking the free flow of ideas, immersing the problem-solver in a powerful experience (for instance, by spending a day in a slum before brainstorming on how to improve the quality of life of slum dwellers), and removal of mental blocks to creative thinking.

Once we understand the mechanics of how good ideas can be generated, there is virtually no limit to the designing of creativity techniques. However, major questions remain: Which of the innumerable techniques would be the most effective? For what sorts of problem situations? And

### Imagery Training: A Way to Originality?

Imagery training is an interesting technique for generating creative ideas of solutions. The basic principle is that it evokes memories and experiences, which then can be combined in novel ways.<sup>8</sup> For instance, there is a technique using imagery training, which is used for training children to write creatively.<sup>9</sup> It attempts to help people to form and change images at will. It works through several phases. Initially, the trainees are told to imagine that they can make things happen. Then they are told to close their eyes and form mental images as the instructor reads aloud passages. Next, they are asked to imagine a parade of stuffed animals with different colours. Next, they are asked to imagine a common object that has many uses, such as a chair or a pencil, and what it would look like if its size, colour, etc. are changed. Towards the end of each of these sessions, the trainees share their images and discuss them as a group. Finally, they are shown a picture, such as of a garden or a mighty mountain or a waterway, to write about.

In the next few sessions, there is a similar guided practice in imaging and discussing images created through stories involving a mountain climbing adventure, a trip to the beach, and the view from within a ping-pong ball. There is also the writing task based on a picture shown to the trainees. The technique can, of course, be modified for use with adults, and for other tasks besides creative writing, such as inventing.

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Imagery training can make people more creative. For a sample of 140 young school-children in the US, it was found that compared to groups that did not have imagery training, the trained group recorded a large increase in originality scores not only at the end of the training, but also after a delay of several days.<sup>10</sup> The conscious control over imaging and over modifications of images seems to yield unusual perceptions that can lead to original outcomes.

The idea of training to evoke images and change them at will can be extended also to training to evoke feelings and sensations,<sup>11</sup> and changing them at will. Images, feelings, sensations—not just ideas—are the stuff out of which creative insights or solutions are forged. If we think of these four as the coloured glass pieces of a mental kaleidoscope, the ability to juggle them at will should increase our ability to experience/visualize unusual options, and therefore, our originality.

how do we identify and further develop for actual usage the 'best' ideas thrown up by an effective technique.

Let me discuss six techniques in some detail, five of them developed by others, one by me. I have found them especially useful in helping a number of problem-solving groups to find creative solutions. These techniques are (1) brainstorming and (2) questions checklist, both developed by Alex Osborn, an advertising executive; (3) attributes changing, developed by Robert Crawfod; (4) morphological analysis, developed by Dr. Zwicky; (5) synectics, developed by William Gordon; and (6) breakthrough, a technique I have developed.

#### **Brainstorming**

The principles of brainstorming are as follows.<sup>12</sup>

- 1. Defer evaluation during the phase of producing ideas, especially evaluation of a negative, critical kind.
- 2. Quantity begets quality. The more the number of ideas generated, the higher the probability of hitting upon some brilliant ones.

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- 3. The more fantastic the ideas, the better. A fantastic idea–one that does not seem at all practical–serves the important function of demolishing conventional patterns of thinking. While the idea itself may not be practicable, it may trigger other ideas that might not only be novel but also useful.
- 4. Hitch-hike on previously expressed ideas. There is no reason to feel ashamed in building on others ideas or one's own previous ideas. In other words, be open to the suggestive power of others or one's own earlier ideas.

Although generally brainstorming is done in groups, it can also be done by individuals. Indeed, some research has indicated that individuals when brainstorming alone, tend to outperform a brainstorm group consisting of equal number of individuals, both in terms of the quantity of ideas and their quality.<sup>13</sup> This point, however, is disputed by Osborn, the creator of brainstorming.<sup>14</sup> Another interesting finding is that better ideas are produced in the second half of the brainstorming session than in the first half.<sup>15</sup> Experimental evidence also indicates that groups that are exhorted to brainstorm, and to go after quantity rather than quality of ideas, end up producing a larger number of creative ideas (novel *and* useful) than groups exhorted to ignore brainstorming and go after quality.<sup>16</sup>

Brainstorming is not useful as a technique where the problem has a unique solution that can be reached by analysis. Clearly, no brainstorming is needed if the problem is to find the square root of 10 million. On the other hand, brainstorming is particularly useful for problems that can have multiple solutions, of which some may be better than the others, such as how we can make a child more interested in arithmetic.

Brainstorming is not very fruitful unless the topic selected for brainstorming is specific. If the topic is vague, the brainstormers will carry different frames of reference and the ideas generated will have a diffused applicability. To take an example, the topic 'how to get ahead in life' may generate many ideas, but since what 'to get ahead' means is not clear, many of the ideas generated are likely to be non-relevant. On the other hand, specific problems like how to get promoted in a particular organization or how to become prominent in a particular society, are likely to yield markedly more useful solutions.

Experience suggest that during brainstorming the leader should encourage the panellists to provide concrete suggestions or ideas rather than abstractions or good intentions. For instance, if the brainstorming topic is how to improve morale in the organization, ideas such as 'improve human relations' or 'increase communications' or 'there should be more *we feeling*" should be ruled out. Instead, the panellists should be encouraged to concretize these ideas – e.g. 'expose every manager to human relations training' or, 'start a monthly newsletter', or 'hire a coach to train a first class cricket team for participation in shield tournaments'. These concrete ideas stimulate hitch-hiking and action orientation. They have an energy charge that abstractions lack.

Also curbed is the tendency of some to give lengthy preambles to their ideas. Ideally, the ideas should be expressed with the brevity, clarity, and specificity of an order.

Brainstorming leads to many ideas. After these ideas are generated, it is usually necessary to identify a few of the better ideas for more intensive investigation. One useful technique is to have each member of a panel vote on the potential of each idea for solving the problem at hand. Sometimes the ideas can be grouped into classes and then each idea within a group may be voted upon. For example, if the brainstorming is on increasing the profits of a company, ideas can be classified into ideas for raising short-term, medium-term, and long-term profits, or even further sub-classified into ideas concerning increase in turnover, decrease in cost, diversification, etc. Sometimes it may be useful to formalize the criteria for assessing the potential of the ideas generated before the ideas are voted upon.

Any reasonable system of voting will do, such as each voter indicating his/her three most preferred choices. If the ideas initially generated are very many, voting may have to be done more than once. That is to say, ideas voted the best in the initial round of voting may again be put to a vote to get a small number of high potential ideas. These ideas may then be taken up for much more intense scrutiny.

After high potential ideas are selected, it may be useful to form task forces for developing and refining each idea. Each task force may be requested to prepare for decision-makers in, say, a month, a brief report that assesses the potential of the idea, an operational plan to make the idea workable, some 'guesstimate' of costs and benefits, and steps that may be needed to execute the innovation. This way, a large number of persons get a chance to participate in the introduction of innovations. This also extends the practical relevance of brainstorming as a technique.

Brainstorming has been widely employed in American government and industry. Osborn, the father of brainstorming, has cited several examples.<sup>17</sup> In a brainstorming session in a federal government officers conference, the group brainstormed on 'What can federal employees do to give visitors to Washington a truer and better impression of their government?' Within 30 minutes, 121 ideas were produced. Some US Treasury personnel produced 103 ideas in 40 minutes on 'How can we get more federal employees to sell more US Savings bonds?' On the problem 'How to reduce absenteeism?', they produced 89 ideas in 30 minutes, and on 'How to free bond-selling employees from office duties?', they produced 61 ideas in 30 minutes. In a telephone company, a brainstorming panel thought up over 100 new ways to recruit new employees. At RCA, a brainstorming session yielded 200 ideas for improving TV receivers.

Brainstorming is a powerful technique. During the visit of the editor of a nationally-read weekly to my course on creativity at IIM-A, the class brainstormed for 40 minutes on how to increase the weekly's circulation greatly without catering to prurient interest. Nearly 150 ideas were generated. Among the more interesting suggestions were: change to a hexagonal shape;

incorporate detachable portions on gardening, cooking recipes, crafts, sections for children, etc; have a cover or pages with magic colours that come out when dabbed with water; have the magazine folded instead of bound, so that it can be unfolded into a wall-paper; perfume the pages; have contests for captions and titles; include articles on self-employed, handicapped persons, artists, inventors, and entrepreneurs; have an investigative/missionary journalism piece in every issue; in each issue, have an article without words; cover the arts and culture of villages, youth, and children; sell ice-creams named after the weekly; let the reporters, or even panels of readers, design an issue once in a while; bring out the weekly in regional languages and appoint literate villagers to read out issues in the village square; preview the weekly on television and radio; put some feature articles in the weekly on cassettes for educational purposes; bring out books of special interest articles published in the weekly; ask scientists to write on their favourite literature, and ask literary people to write their responses to scientific discoveries, etc. The editor seemed to be swept off his feet by the avalanche of ideas.

The effectiveness of group brainstorming can be augmented substantially through computerization. In brainstorming, ideas are generated sequentially; the categorization of ideas after the idea generation phase is over is time consuming, and so is the voting/selection process by which high potential ideas are identified for priority action. The advent of Personal Computers (PCs) and the Local Area Network (LAN) and other forms of connectivity like the internet can vastly increase the creative productivity and efficiency of brainstorming. Hundreds of persons separated by thousands of miles can participate in a brainstorming with the help of IT software and equipment. Milan Aiken and Mary Riggs have called this the Group Decision Support System (GDSS). They have explained how a GDSS works at the University of Mississippi, US.<sup>18</sup>

- 1. Upto 54 persons can be accommodated in an electronic meeting room stocked with PCs and interconnected through a LAN.
- 2. Besides the PCs, a video projection unit, overhead projectors, and microphones are also made available.
- 3. This GDSS uses three software programs, *Brainstorm, Idea Consolidator*, and *Vote*. They are utilized in sequence.
- 4. *Brainstorm* enables group members to exchange ideas simultaneously, and if need be, anonymously, and also lists these ideas on a screen visible to everyone. Ideas get entered in droves, and group members can respond to each other's ideas instantly, rather than sequentially as in the non-computerized brainstorm.
- 5. So many ideas can get generated (in one GDSS used at IBM, over 600 ideas/comments were generated in just over half-an-hour) that some sorting and categorizing becomes inescapable. The *Idea Consolidator* software makes this easy. It sorts the ideas automatically on the basis of similarity of their keywords. It also enables

individual members to sort them on the basis of their own categories, and to assign topic headings for each category of ideas/comments.

6. *Vote* facilitates very quick ranking of the ideas. For each category of ideas, group members can indicate the rankings of the ideas in the category, which then are instantly aggregated by *Vote*. Thereafter *Vote* presents rankings of the ideas in each category.

The use of GDSS seems to be increasing fairly rapidly. "Thousands of people in dozens of public and private organizations worldwide (over 15000 employees at IBM alone) have been involved with GDSSs. This new technology increases participation, quality, and productivity of main types of organizational meetings. GDSSs appear to significantly facilitate group creative behaviour through electronic brainstorming sessions".<sup>19</sup>

Brainstorming is not only a technique, it is a culture. Its clear message is that at least for divergent thinking, a democratic and collaborative culture works. During a brainstorming session, people drop their defensiveness, and instead of competing for power and status, they compete for the excellence and creativity of their ideas. Brainstorming reinforces a sense of participation, especially if brainstorming is followed by voting on the best ideas. As is well-known, participation increases commitment to implement the participatively chosen course of action.<sup>20</sup> Finally, brainstorming increases self-confidence and a sense of resourcefulness. The avalanche of ideas it produces provides a clear demonstration of the power of the human mind to overcome obstacles. The implications of using brainstorming for decreasing authoritarianism in collectivities ranging from the family to industry, government and educational institutions, and in industrial relations, are staggering.

#### **Checklist of Questions**

Questions, as somebody put it, are the creative acts of intelligence, for often they energize divergent thinking. People generally regard speaking the truth as a good thing. Somebody who asks, "Is it?" triggers a somewhat frantic scramble for the justification of this widespread belief. Whether or not it leads one to the conclusion that truth is a good thing, it is likely to clarify more than before what we mean by truth, what is good about it and what is not so good about it, the circumstances under which it may be good, and the consequence of truth and falsehood.

A variety of questions can aid invention or improvement. Alex Osborn, in four brilliant chapters in his *Applied Imagination* has illustrated the power of questions in leading individuals to inventions and improvements.<sup>21</sup> Some of the more powerful questions that can improve a product, event, or activity are the following.

• What can we *add* to the item to improve it?

- What can we *subtract* or delete from it without damaging it?
- What aspect or component can we *alter*?
- Can we rearrange its components?
- How can we *adapt* the item for uses other than the present one?
- Can we magnify the item greatly-say, its dimensions or its impact?
- What could be the *opposite* of the item (that is, what thing would have almost diametrically opposite properties)?
- Can we *minify* or miniaturize the item or make it far more compact, or modularize it?
- What *other* uses can we put the item to?
- Are there *alternative* ways of producing the item?

The first letters of the words italicized above yield an acronym ASARAMOMOA. Perhaps a simple example may illustrate the power of this technique. Let us assume that someone is trying to improve the design of a typical steel cupboard of average size (say 6 feet high, 4 feet wide, and 2 feet deep). We can *add* to such a cupboard a number of things: mirror, fan, wallpaper or some other decoration, casters, magnets to hold slips of paper, book shelves or other shelves above the cupboard, different sizes and types of shelves of use inside the cupboard, secret lockers, etc.

One can *subtract* not too many things from a cupboard, but some shelves can be removed to permit the storage of bulky things. If one is daring, the entire rear panel can be removed and the cupboard rivetted to the wall. A number of things can, however, be altered. The clumsy handle can be altered, possibly replaced by a button or a knob. Certainly the paint can be altered, with the possibility of different paints on different side of the cupboard. If one is venturesome, one may replace the steel doors by transparent plastic or glass doors. There are obviously innumerable possibilities of altering the shape and material of the cupboard. There are numerous possibilities for rearranging the compartments. An intriguing possibility is to let the cupboard rest on a side rather than be kept upright, so that its doors open up and down rather than sideways. This would, besides facilitating the storage of long objects, permit the use of the cupboard can be laid on its back and be turned into a very large chest or a small swimming pool!

As far as *magnification* is concerned, one can think of much taller, wider, or deeper cupboards with doors at sides, too. Indeed, once can insert a large cupboard in place of a wall separating two rooms with doors on both sides and partition in the middle of the cupboard to serve as a wall as well as two cupboards. One could think of a huge community cupboard. Thinking about the *opposite* of the steel cupboard may lead one to conceive of an open cement or brick structure on the floor made up of storage spaces without covers in which one could store a variety of things. A walk-in closet without locks is another 'opposite'. Thinking of *minification* may lead one to

conceive modules of a cupboard that can be placed in any way one chooses to, side by side, one on top of the other, placed in different corners, etc.

We have already noted the possible others uses of a cupboard as a chest, a wall, a settee, and a swimming pool. It also has possibilities of being turned into a bed or a small garden, not to mention a grave! And a question as to an *alternative* mode of producing a steel cupboard may lead one to the marketing of do-it-yourself kits.

Like brainstorming, a questions checklist also incorporates important creativity enhancing values. The chief one is dissatisfaction with the status quo. The habit of questioning everything is indispensable if conservative cultures are to become innovative cultures. The resurgence of the West after the 15<sup>th</sup> century is mainly because it recaptured the Greek spirit of inquiry and put it to practical use.

#### **Attributes Changing**

Attributes changing is a useful technique for designing or redesigning a *specific* product or service or activity. The technique was developed by Robert Crawford.<sup>22</sup> According to Crawford, magic inspiration is not the only, or even major, source of creativity. Much creativity arises from changing the attributes of a thing (be it a product, service, activity, or event), or from grafting on to the thing an attribute or attributes of some other thing. For example, many years back travelling bags used to be made of metal to ensure durability. Nowadays, durability is secured by using much lighter plastic substitutes. Here, the attribute of the material of the bag was changed to create a new type of bag. Casters, so useful in skating, have been grafted on to some of the bags to make it easier to transport them at railway stations or airports. Compartments, used in cupboards for easier access to different types of apparel or personal belongings, have also found their way in some bags.

In attributes changing, the attempt is made first to list the basic but *modifiable* attributes or properties or specifications of the item. Then an attempt is made to generate interesting alternatives to the current attributes or specifications. As an example, if one wants to redesign a particular eraser, the non-modifiable attribute is that it must serve as an eraser. But there are several modifiable properties, such as the substance for erasing, current capacity to erase (say pencil writing but not ink writing, type, or print), and shape. One then asks, "Are there alternative materials that can also erase, such as certain types of plastic? Can an eraser be developed that erases not only pencil writing but also ink writing, type, and/or printed material? Can the eraser have a shape other than the usual rectangular one, such as circular or spherical or triangular?" This kind of questioning can uncover many alternatives.

In addition, one can also think of grafting on to an eraser the attributes or properties of some other objects. For instance, erasers used for erasing written material often get soiled, and leave

smudges on paper. Can the razor's capability of shaving hair be grafted on to an eraser so that whenever the eraser gets dirty, its dirty surface can be finely shaved off? Can the eraser be scented to make it more attractive? Can it come in various colours for the same purpose?

In attributes changing, very often it may be useful to list abstract attributes of a concrete object or activity. This may help in generating more ideas than if the concrete attributes are listed. For example, if one wants to generate ideas for redesigning a cup, it may be better to conceive it as a container than as a tea-cup, for thinking of the cup as a container makes possible designs that enable the uses of a cup not only for drinking tea but also to eat from, use as a flower vase, cook in, etc. Similarly, it may be better to consider handling convenience as an attribute rather than the cup as having a handle to hold it. Handling convenience may yield interesting options like handleless holding (such as a square base), or an overhead loop as in a lantern. Asking what *function* a current attribute serves, and then looking for alternative ways of performing the function is a way of locating the abstract properties or attributes of an object or activity. The technique of value engineering is partially based on this approach. In value engineering, the attempt is to identify the functional value of a product's components or attributes and then search for ways the functional value can be secured at the least cost, or increased for a given cost.

Crawford has summarized the principles of attributes changing as follows.<sup>23</sup>

- 1. Creation is not inspiration alone-it is largely adaptation and experimentation.
- 2. Creation is not just mechanically combining different products or ideas. It is *useful* modification of an attribute or assimilation of the attributes of other things.
- 3. In trying to modify the current attributes of a thing, it is desirable to search for concrete alternatives. For instance, if one is seeking to change hard railway seats, one should think not of just soft seats, but seats with the softness of a pillow or vinyl or foam.
- 4. Creativity can be systematized by looking first for closely-related substitutes of the current attributes and then progressively going in for more and more far-out alternatives.
- 5. Creation is not just stealing of ideas. It is a continuing stream of modifications suggested by ideas in use which, over time, result into greatly changed products or objects. Thus, current petrol-based cars certainly use the principle of internal combustion engine that was developed in Germany years ago. But the car of today is a far cry from the first vehicle produced by Daimler-Benz, thanks to the thousands of modifications incorporated into the automobile over the years. In weapons systems, too, it has been found that radically changed weapons systems are the consequences of many small innovations in the system.<sup>24</sup>

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We may add that the more specific the object or activity one wishes to change, the better would be the results given by attributes changing. Also, it helps to separate the modifiable from the unmodifiable attributes of the object, and to concentrate one's attention on the modifiable attributes. A useful procedure is to list exhaustively all the important attributes of an item, such as its current size, colour, shape, function, weight, major components, material, etc., for an object, and current duration, function, steps, sub-activities, etc., for an activity. Next, it is desirable to identify some of these attributes that can possibly be altered without destroying the main function of the item. Next, the alterable attributes may be stated as more abstract, general attributes (e.g., weight of 10 pounds or less for a bag as lightness; back rest for a chair as spine support; black print in white pages for a book as readable print; etc.) Asking what functions these attributes perform, and how critical these functions are to the main use of the object or activity would not only help in listing necessary attributes in abstract terms, but also help one in fixing priorities of attributes and in encouraging one to look for alternative ways of satisfying functional requirements. For example, if lightness is a desired attribute of a ladder, asking why a ladder should be light may help one consider other options besides lightness to make it easy to transport a ladder from place to place, such as attaching casters to the ladder, or making it collapsible.

#### **Morphological Analysis**

Morphological analysis is a variant of attributes changing. The technique was developed by Dr Zwicky.<sup>25</sup> The basic idea is that if one identifies some critical modifiable attributes as in attributes changing, and writes down several alternatives for each of these attributes, one can generate a very large number of alternative designs of an item. Consider dissemination of daily news. This can be done by newspapers, radio, television, telephone, or direct briefing (these are alternatives for the attribute of medium of dissemination). A second attribute can be frequency (once a day, twice a day, thrice a day, etc.). A third attribute can be coverage (local, regional, national and/or international news). A fourth can be content (political, economic, social, cultural, scientific), etc. We can think of a four-dimensional figure, on which five alternative media are listed along one axis, three frequency alternatives are listed along a second axis, four coverage alternatives are listed along a third axis, and five content alternatives are listed along a fourth axis. There would be 5x3x4x5=300 cells in this figure, each cell representing a unique kind of news dissemination. For instance, one can think of dissemination by newspapers once a day of local news, which are mainly social, versus, say, Internet dissemination of news thrice a day covering mainly international scientific news. To be sure several of these 300 types of news dissemination may be quite impractical. But it is also possible that a few are practical but have been overlooked so far.

Arnold has suggested that there is one basic difference between attributes changing and morphological analysis. Attributes changing works best when the product, object, or activity

sought to be modified is very specific; 'this' chair rather than chairs in general. On the other hand, morphological analysis can also be applied profitably to modify general objects or activities, such as air transportation or health care or political machinery.<sup>26</sup> Obviously, when attempting to use morphological analysis for generating fresh designs for a class of objects, the more fundamental the attributes utilized, and the more off-beat the alternatives considered, the more novel are likely to be the alternative designs that emerge.

Attributes changing and morphological analysis are not merely techniques. Like brainstorming, they embody important creativity-favouring attitudes and values. The chief such value is one of tinkering, or trying out a new combination. This makes for an experimental, innovative bent of mind. It also alerts one to possible new applications of ideas.

#### **Synectics**

Synectics, Inc. is a Boston-based organization that specializes in finding solutions to complex technical or other problems that have defied solution by experts. The word synectics has been adapted from the Greek word synecticos, meaning fitting together diverse elements. Synectics, Inc. as founded by a brilliant tinkerer name William J.J. Gordon. Earlier he was a raiser of pigs, master of a sailing schooner, a school teacher, a horse handler, a ski instructor, an inventor, an author, a college lecturer, and a dabbler in history, biochemistry, physics, psychology, and philosophy in his college years. It was co-founded by George Prince, a former advertising executive. The creativity technique for which Synectics, Inc. is best known is also popularly known as synectics.<sup>27</sup> It is a very remarkable technique of group problem solving, and to a non-initiate it looks like a mad method for finding solutions. But it seems to work often enough, as testified by the clientele of Synectics, which includes Colgate-Palmolive, Kimberley Clark, Singer Manufacturing, Western Electric, Johnson and Johnson, General Electric, IBM, Union Carbide, Monsanto, and other leading US corporations. Synectics has been able to develop fresh workable approaches to such difficult problems as creating a wheelchair that can climb stairs, accurately estimating petroleum reserves thousands of feet underground, elimination of hostility between ethnic groups at lower levels in a department store, reducing the demand for out-patient psychiatric help in a hospital, etc. It has resulted in such innovations as a trash compactor, magnesium-impregnated bandage, box method of packing potato chips, etc. Besides, training in synectics can lead to striking increases in creative problem-solving test scores.<sup>28</sup> The following brief excerpt of a synectics session is typical.<sup>29</sup> The problem was to invent a vapour-proof closure for space suits (the mechanisms of synectics are shown in brackets).

- T: Let's imagine you could will the suit closed... and it would do just as you wanted by wishing... (Fantasy Analogy mechanism)
- G: Wishing will make it so...

- F: Shh, okay. Wish fulfilment. Childhood dream... you wish it closed, and invisible microbes, working for you, cross hands across the opening and pull it tight...
- B: A zipper is kind of a mechanical bug (Direct Analogy mechanism). But not air-tight...or strong enough...
- G: How do we build a psychological model of 'will-it-to-be-closed?'
- R: What are you talking about?
- B: He means if we could conceive of how 'willing-it-to-be-closed' might happen in an actual model, then we...
- R: There are two days left to produce a working model and you guys are talking about childhood dreams! Let's make a list of all the ways there are of closing things.
- F: I hate lists. It goes back to my childhood and buying groceries...
- R: F, I can understand your oblique approach when we have time, but now, with this deadline...and you still talking about wish fulfilment.
- G: All the crappy solutions in the world have been rationalized by deadlines.
- T: Trained insects?
- D: What?
- B: You mean, train insects to close and open on orders? 1-2-3 Open! Hup! 1-2-3 Close!
- F: Have two lines of insects, one on each side of the closure-on the order to close they all clasp hands...or fingers...or claws...whatever they have... and then closure closes tight...
- G: I feel like a kind of Coast Guard Insect (Personal Analogy mechanism).
- D: Don't mind me. Keep talking...
- G: You know the story... Worst storm of the winter...vessel on the rocks... can't use lifeboats... some impatient hero grabs the line in his teeth and swims out...
- B: I get you. You've got an insect running up and down the closure, manipulating the little latches ......
- G: And I'm looking for a demon to do the closing for me. When I will it to be closed (Fantasy Analogy mechanism), presto! It's closed!
- B: Find the insect–he'd do the closing for you!
- R: If you used a spider... it could spin a thread... and sew it up (Direct Analogy).

- T: Spider makes thread... gives it to a flea... Little holes in the closure... flea runs in and out of the holes closing as it goes...
- G: Okay. But those insects reflect a low order of power... When the Army tests this thing, they'll grab each lip in a vise one inch wide and they'll put 150 pounds on it... Those idiot insects of yours will have to pull steel wires behind them in order...they'd have to stitch with steel. (Symbolic Analogy mechanism).
- B: I can see one way of doing that. Take the example of that insect pulling a thread up through the holes... You could do it mechanically... Same insect... put holes in like so... and twist a spring like this... through the holes all the way up to the damn closure...twist, twist, twist... Oh! Crap! It would take hours! And twist your damn arm off!
- G: Don't give up yet. May be there's another way of stitching with steel.
- B: Listen...I have a picture of another type of stitching... That spring of yours... take two of them...Let's say you had a long demon that forced its way up... like this...
- R: I see what he's driving at...
- B: If that skinny demon were a wire, I could poke it up to where, if it got a start, it could pull the whole thing together...the springs would be pulled together, closing the mouth... Just push it up... push... and it will pull the rubber lips together...Imbed the springs in rubber... and then you've got it stitched with steel!

This may look like madness, but there is a method to it. Before we turn to the method, a brief excursion into the structure of the mind may be helpful. We can think of the mind as having several layers. Each layer is, of course, connected to the others, but has a distinctive mode of functioning. The deepest layer is that of our unconscious mind. It is the hothouse of instincts, the heritage of our animal past. Its vital function is self-preservation and reproduction. It has available to it enormous energy but little self-regulation. When we are livid with rage or sexually aroused, this layer of our mind is ascendant. The next higher layer is the preconscious mind. This is a fantasizing and imagining layer, very prominent in childhood. The structure of fantasy is interesting. Fantasy has, as its core, some wish fulfilment, that is, fantasies are motivated by the desire to fulfil needs not in reality fulfilled. This wish fulfilment is accomplished by giving the imagination a free rein and by dropping real-life constraints that impede wish fulfilment. The preconscious mind constructs solutions to problems ignoring real-life impediments. It thinks in visions and scenarios known well to us through our reveries, daydreams, and fantasies. It constructs these through associative thinking and playful elaborations of images. The preconscious is ascendant when we are in the grip of a grand vision, or fantasize ourselves as defeating Bjorn Borg or getting crowned as an emperor. Finally, there is the layer of the conscious mind, which is relatively highly orderly, logical, evaluative, and analytical. It is very aware of

reality and its constraints, and its function is to manage the entire personality and have it respond quickly and in a coordinated manner to stressful and other situations. The conscious mind is ascendant when we are in a businesslike mood.

As several creators, discoverers, and inventors have noted, they seem to get their best ideas not when they are in a businesslike mood but when they are in a reverie-like state of relaxation, that is, when the preconscious is ascendant.<sup>30</sup> Psychoanalysts, too, have suggested that creative ideas are most likely to occur in such a state. Ernst Kris called this childlike reverie state regression in the service of the ego.<sup>31</sup> If this reservoir of creativity is to be tapped, one must understand the mechanics of the preconscious (such as combinatorial play, free association, ability to create scenarios, the dropping of real-life constraints in cooking up solutions to problems, etc.), and equally important, one must have access to the preconscious at will. The mental habits and blocks that preclude fantasysing as silly during the businesslike state have to be weakened, and the tolerance for the absurd, the weird, the seemingly irrelevant or logically unconnected, increased.

It is the signal achievement of the founders of synectics that they have devised systematic ways of accessing and harnessing the preconscious. What they have sought to do is to imitate the processes of incubation in the preconscious mind. (Incubation is the phase of problem solving in which the preconscious mind is working out the solution of a complex problem without the conscious mind being aware of this.) The preconscious mind does not think logically; it thinks analogically, associatively, visually. The principle mechanisms used in synectics for solving problems are the uses of several different kinds of mind-stretching analogies, and a good deal of fantasizing.

Synectics uses four types of analogies. **Direct analogy** involves seeking a direct comparison of the phenomenon under discussion with some other phenomenon that is similar enough. For instance, if aerodynamics of a plane are under discussion, the group may explore how birds manage to fly and thereby seek insights into a plane's aerodynamics. For many problems, the Synectics staff have found analogies from biology particularly useful in generating fruitful insights. The more far-fetched the analogy, the greater the probability that the angle suggested by the analogy has not previously been thought of by anybody.

Another type of analogy used in synectics is the **personal analogy**. The attempt here is at a peculiar kind of empathizing. The person is asked to retain his/her individual human sensibility but is simultaneously asked to transport himself/herself into a situation and to report what he/she feels, sees, hears, thinks, etc. For instance, if the discussion is about static in the radio, the leader may ask group members to imagine themselves to be a radio and to tell the group what they feel, see, hear, etc.

Then there is a type known as **fantasy analogy**. In this one, the group members are urged to imagine a constraint-free solution, in much the same way as our wish-fulfilling day dreams. Group

members are urged to fantasize some perfect solution even if it flies in the face of known scientific principles. For instance, in designing a space suit, it is important that it be closed perfectly. A fantasy analogy could be that the space suit closes shut simply by the person wishing so, or by getting microbes or demons to close it perfectly.

Finally, there is the **symbolic analogy**, also called book title. In this, the leader may take a key word, or even some discussion, and ask group members to come up with a short, provocative phrase that captures the essence of whatever is under discussion but such that it is aesthetically satisfying or paradoxical. Examples of book titles are '*progressive ingestion*' for forest fire, '*discrete infinity*' for multitude, '*involuntary willingness*' for receptivity, '*impure aggressor*' for acid, and so on. The attempt here is to generalize something highly significant about a key word or discussion but impregnate it with something paradoxical or anomalous or striking. This would stimulate further exploration, such as group members searching for others examples that embody the properties of the book title.

George Prince of Synectics, Inc. has described the structure of the synectics process as follows.  $^{\rm 32}$ 

- 1. The problem is explained to the group by an expert.
- 2. The group attempts to solve the problem in the usual way for a while. This phase is called 'purge'.
- 3. If the problem remains unsolved, the leader asks the members to state the problem as they understand it. This is called the problem as understood (PAU) step. As an example, if the problem is of estimating petroleum reserves thousands of metres underground, one member of the group may say that the problem, as he understands it, is to make the reservoir tell the truth; another may say that it is to have the oil say how crowded it is in the reservoir rock. In generating a PAU, the person may either state the problem as he sees it (e.g., a paraphrase of the actual problem), or he may state somewhat fancifully a desirable goal without worrying whether the goal he states is realistic or not, such as rocks informing him how oil-full they feel.
- 4. Next, the leader may ask an 'evocative question', such as an example from some other field, of an aspect of the chosen problem as understood. In the above example, an evocative question may be 'Can you think of a crowded situation from biology?' Here the leader is asking for what is called a direct analogy.
- 5. A number of responses may be made to an evocative question. 'Flies on cow dung', 'virus culture', 'womb with triplets', 'drop of sperm' etc. could, for example, be such responses to the evocative question concerning a crowded situation.

- 6. At appropriate places, the leader may request a personal analogy. For example, he may take up 'virus culture', and ask each group member to imagine himself or herself as a virus in a virus culture and describe the feeling. Group members may come forth with statements like, "I am curled like a corkscrew', "It is nice and warm here but I feel itchy", "I hate the world... I want to murder".
- 7. The leader may also ask them to fantasize without reservations about how one could, as a virus, set out to conquer the world. This would be asking for a fantasy analogy.
- 8. The leader may ask for a 'book title' or symbolic analogy–say a two- or three-word title, poetic and compelling, that captures the essence of a key word or phrase such as virus culture, and contains a paradox. Participants may respond with such book titles as 'warm hate', 'indifferent destruction', and 'compulsive indifference'.
- 9. The leader may pick a particularly intriguing book title, such as compulsive indifference, and ask for direct analogies, that is, examples in nature of compulsive indifference. Responses may be 'queen bee', 'cat', etc. An exploration of the behaviour of one or more of these may follow.
- 10. At some point, when the leader senses that a potentially useful approach to the original problem is at hand, he may ask for a 'force fit'. That is, he may ask the participants to try to think how a present idea or analogy or situation could suggest a solution to the original problem. In the case of the problem of estimating petroleum reserves, the force fit yielded the idea that just as one strokes an angry cat to make it calm, one could pump down a coolant that freezes the core sample in a pipe, so that the sample does not undergo changes in composition as it is brought up thousands of feet. If the force fit does not yield satisfactory results, another cycle (called excursion) of PAUs, analogies, examples, and force fit may be started.

Whenever a potentially interesting approach is found it is filed as a 'viewpoint'. Synectics does not necessarily aim at finding full-fledged solutions to problems. More commonly it aims at identifying promising approaches or viewpoints that possibly could lead to novel solutions to vexing problems.

Synectics is founded on two distinctive mental processes. One involves an attempt to see the unfamiliar in a familiar way. Preliminary analysis of the problem is an attempt at doing this. The statement of the problem as understood by the participants is also an instance of this process. The force fit also achieves this, as does discussion of examples and instances. The other process involves seeing the familiar in an unfamiliar or strange or out-of-focus way, the attempt, so to speak, to see the world with head upside down. The various analogies and the use of fantasizing help one observe the familiar in a strange, unfamiliar way. Throughout, the two processes are harnessed to maintain constructive psychological strain. In other words, the rapid shifts of

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focus-from making the strange familiar and vice versa-keep the mind in a state of constructive agitation in which the probability of hitting on an original viewpoint is heightened. As in brainstorming, any evaluation is, of course, taboo. And as in the checklist of questions and brainstorming, the pressure is on for novel ideas and viewpoints. The essence of synectics, as also of other techniques of creativity, is a mood of relaxed alertness. The mind is agitated but not anxious, and the agitation often turns to peaks of exhilaration as a new idea or a novel perspective sweeps the brain off its convolutions!

Synectics is a group technique and it thrives on the diversity of its members. The role of the leader is not to set an agenda or assess members' contribution or assess and announce the consensus. His/her role is rather that of keeping group members stimulated by shifts in focus through calling for different kinds of analogies. Also, he/she has to be good at sensing a solution and at calling for a force fit at the right time. His/her role is that of building up a cerebral charge so that an illumination can become highly likely. For this to happen, the leader may not only ask for various kinds of analogies, but may also encourage group members to play with words, laws, or metaphors to achieve strange perspectives, try to invert perspectives (for example by suggesting

that it is iron that attracts the magnet rather than vice versa), repeal inconvenient laws of nature, juxtapose colliding analogies, an so forth.

Synectics is not merely a technique for solving difficult problems. It may also be a powerful technique for training people to become more flexible and original, and to tolerate ambiguity and 'irrelevance' more. Practice with synectics tends to make the mind supple, capable of rapid and breathtaking shifts of focus, a capability that may considerably increase flexibility and originality.

Synectics is a difficult technique, but its mechanisms and its principles are eminently practical. Even an individual should be able to try and see familiar problems or situations in odd ways through the use of different kinds of analogies, and thereby enrich his/her perception of the problem and the range of approaches available to him/her.

#### **Breakthrough**

I have developed a group creative problem solving technique called 'breakthrough' that draws on several other techniques and has some distinctive points as well. I have found it quite useful in 'people'-related problems—conflicts, alienation or lack of motivation, inability to see the real problem or some important dimensions of the problem, management issues, etc. More than most techniques, it emphasizes the identification of the problem's stakeholders, multiple ways of defining a problem, and demolition of the chosen alternative and its reconstruction.

Let me illustrate the technique with the help of a real-life problem. A large and diversified Indian professionally managed equipment manufacturing company, with locations in all the metropolitan cities, has a problem on its hands. It hires young management graduates from the best management schools in the country, gives them about four years of rigorous and multi-functional training, rotates them through various functions like finance, planning, budgeting, marketing, operations, R&D management, and human resource development, and then gives them a managerial responsibility with staff reporting to them. Unfortunately for the company, many of the youngsters leave the company shortly after getting a managerial responsibility, especially so in Mumbai.

The technique involves the following steps.

- 1. Each group member is asked to state the problem as he/she sees it, preferably in an evocative, metaphorical language that excites the imagination of others. Somebody may see the problem as a very long and tedious ladder; another, as treasure hunt by the MBA; another as the marriage barrier in Mumbai; still another as corporate leukaemia, and so on.
- 2. The group is then asked to define the 'stakeholders' in the problem, that is, those who contribute to the problem and/or are affected by it. Besides the MBAs themselves, the

group members may identify their bosses, the personnel department, corporate management, other non-MBA professionals hired by the company such as engineers, the companies that hire the MBAs after they finish the in-company training, the management schools from which the MBAs are hired, etc. The listing of so many stakeholders is generally an eye-opener for group members, because it discloses the multiple dimensions of most people-related problems. It also alerts them to the various conflicting interests that must be reconciled for the solution to be an abiding one.

- 3. The group is now divided into stakeholder teams, that is, a team of one or more group members is asked to take the perspective of a particular stakeholder. Each team is asked to define the problem from the perspective of the stakeholder.
- 4. The new definitions of the problem are shared in the whole group. Some typical new definitions are erosion of the credibility of leading management schools in the eyes of professionally managed companies; fear of companies hiring the MBAs that the MBAs may ditch them in turn, and indeed become competitors; the fear of the company's management that the MBAs may provide its business secrets to the hirers; the lack of affordable housing for MBAs once they get married, especially in Mumbai, etc. After the sharing, each member is asked to define the problem as he/she now sees it, keeping in mind the new definitions.
- 5. The group then votes on the various problem redefinitions, and the top one or two redefinitions are selected for brainstorming for solutions by the entire group.
- 6. After the brainstorm, there is voting on the various solutions generated through the brainstorm, and the top idea is selected.
- 7. Now the group engages in reverse brainstorming. That is, each member indicates why the selected idea will <u>not</u> work.
- 8. Having battered the selected idea with objections about its effectiveness, now each group member is asked to reword the chosen solution in a way that takes into consideration important objections. The group then selects a reworked idea from among those generated by the group members. The idea is now ready for further development, vigorous cost-benefit analysis, and implementation planning. The whole process can be repeated for other interesting problem redefinitions and solutions. The end result usually is elaborative creativity of a high order.

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# A COMPARISON OF CREATIVITY TECHNIQUES

All of the six techniques we have reviewed in this chapter facilitate divergent thinking. All but one of them are usable when the problem is well-defined and clear. Breakthrough is designed to tackle unclear, multi-dimensional problems also. Synectics and breakthrough are group techniques; the other four can be employed both by individuals and groups. There are some differences in their applications. Brainstorming, breakthrough, and synectics do not presume the existence of a current (imperfect) solution to the problem; attributes changing, morphological analysis, and questions checklist do. Brainstorming is particularly relevant when the problem is precise but the solutions are likely to be many, and there are not too many constraints that these need to satisfy. In other words, brainstorming is particularly useful for relatively straightforward, well-defined, multi-answer problems. At the other extreme, synectics is particularly well-suited where the problem has the structure of a typical problem in science-considerable difficulty due to the solution having to respect varoius constraints and specifications, and typically few possible answers. Breakthrough can tackle quite complex problems, but primarily those relating to people. Questions checklist, attributes changing, and morphological analysis are intermediate in respect of problem difficulty and multiplicity of solutions. These techniques also differ from one another along the ease of use and the extent of divergent thinking needed. Attributes changing, morphological analysis, and brainstorming are the easiest to operate; breakthrough is a bit more difficult; synectics, easily the most difficult. The extent of divergent thinking is generally quite limited in attributes changing and morphological analysis, it is more in brainstorming, and could be even more in questions checklists and breakthrough; and certainly most in synectics. These techniques also differ in the creative ability they most utilize. Brainstorming mostly draws upon fluency; synectics upon flexibility and originality; attributes changing and morphological analysis upon analytical capacity (in identifying the main modifiable attributes of the problem situation) and some fluency; questions checklist upon flexibility and problem sensitivity; and breakthrough upon problem sensitivity, problem restructuring ability, flexibility, and fluency. The techniques also differ in their main aims. Brainstorming, attributes changing, morphological analysis, and breakthrough are mainly designed to increase the choice of alternatives; synectics and breakthrough to identify some fresh approach to a seemingly intractable situation; and questions checklist and attributes changing to refine a solution. It stands to reason that, for problems requiring divergent thinking, it makes sense to start with attributes changing to break the problem down into major modifiable components, then use brainstorming to generate a large number of relatively crude alternatives, switch if necessary to synectics if the problem becomes intractable once constraints are introduced, or to breakthrough if the problem is a tough people problem, and refine the potentially most useful solution(s) through questions checklist.

The similarities and differences of the six techniques are summarized in Table 15.1.

# CONCLUDING COMMENTS

We need not be slaves to any one technique. We ought to be able to use all of them discriminatingly. More importantly, we ought to be able to combine them, or indeed, create new techniques to suit our particular purposes. There is no reason why attributes changing or questions checklist cannot be introduced into synectics or breakthrough, or why analogies cannot be used in brainstorming or breakthrough. It is important to master their principles and mechanisms, so that we can tailor a technique to respond effectively to the problem at hand.

A summary of the principles that underlie these creative thinking techniques is as follows.

- 1. Structure the problem so that it is well understood. Restructure it in interesting ways. Identify some key dimensions or sub-problems for innovative exploration.
- 2. Separate the phase of idea production from that of rigorous idea evaluation. Do not criticize ideas–whether of one's own or another's–during the time they are being articulated.
- 3. Ideate copiously. Churn out a large number of ideas both because this heightens the possibility of hitting upon some really good ones, and also to let one idea lead to another and to still another, and so on, like a chain reaction.
- 4. Create constructive psychological strain by continuously enticing the person or group to go from the familiar to the unfamiliar terrain and back to the familiar, such as by

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	Brainstorming	Questions Checklist	Attributes Changing and Morphological Analysis	Synectics	Breakthrough
Main principles	By deferring evaluation during the phase of idea production, both quantity and quality of solutions can be greatly increased. Many ideas need to be reduced to a few 'best' ones for careful evaluation.	Questions are the creative acts of intelligence, for each question alters the mental frame and triggers fresh enquiry.	Much of creation arises from modification of an object, event, or activity's features, or through graft- ing on to an item the fea- tures of some other thing	Off-beat analogies can help identify novel but useful approaches to intractable problems. For yielding original ideas, creative tension needs to be main- tained by repeatedly going from the familiar to the unfamiliar and vice versa.	'People' problems are multi-dimensional and need to be redefined from the perspectives of different stakeholders before brain- storming for solutions. Creative solutions need to be made more implemen- table through reverse brainstorming.
Main operations	(For group brainstorming) one idea at a time; no evaluation; hitch-hiking encouraged; odd ideas encouraged; computer can greatly enhance brain- storming and collective evaluation capacity.	Subject an object, solution, or activity to a barrage of questions such as what to add, delete, modify, what other uses, can the object be compressed or magni- fied or dispensed with alto- gether, etc.	Identify the major modifi- able abstract attributes of an object or activity. List a few interesting alternative ways each attribute can be satisfied. Assess the feasi- bility of novel combinations that emerge.	Excursions involving cycles of problems as understood (PAUs), various types of analogy, discussion of examples, and force fit	Evocative definitions of PAUs is followed by problem restructurings by 'stakeholders', the use of brainstorming methodol- ogy, and reverse brain- storming for flaws of 'best' idea for the latter's rectifi- cation.

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TABLE 15.1 7

	Brainstorming	Questions Checklist	Attributes Changing and Morphological Analysis	Synectics	Breakthrough
Type of problem for which most suit- able	Well-defined, multi- answer, fairly straightfor- ward problem with few constraints	Well-defined, multi-answer problem that has a current imperfect solution in the shape of an object or activ- ity	Well-defined, multi- answer, fairly simple problem that has a current imperfect solution in the form of an object or activity	Well-defined, quite difficult or complex problem with few answers	III-defined people-related problem with many poten- tial solutions
Main aim	To generate a lot of alter- native solutions to a problem	To refine, by adding, delet- ing, or modifying the fea- tures, etc. of a solution presently in use or a cur- rently used object or a current activity	To generate innovative alternatives for specific fea- tures of a present object or activity and thereby gener- ate a large number of alter- native designs of the object or activity	To generate one or a few fresh approaches to intrac- table problems	To yield insightful and innovative solutions to tough 'people' problems
Mode	Individual or group	Individual or group	Individual or group	Group	Group
Ease of use	Easy	Moderately difficult	Easy	Difficult	Moderately difficult
Extent of diver- gent thinking needed	Considerable	Considerable	Relatively little	Very great	Considerable

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Techniques of Creative Problem Solving

	Brainstorming	Questions Checklist	Attributes Changing and Morphological Analysis	Synectics	Breakthrough
Type of diver- gent thinking needed	Mainly associative, chain- reaction type	Mainly oriented to search- ing the memory for appro- priate modifications to current item	Mainly oriented to search- ing the memory for alter- natives for an attribute	Analogical, symbolic, empathic, and visionary	Shared diversity of problem, perceptions, and problem redefinitions plus as in brainstorming
Extent of con- vergent thinking needed	Low while generating alter- natives, high while select- ing those with greatest potential	Low	Fairly high during identify- ing main attributes; also in synthesizing interesting designs from alternative attributes	Low during excursions; high during force fits and PAUs	Low while generating solu- tions, high while selecting high potential solution(s)
Creative ability most utilized	Fluency	Flexibility and problem sensitivity	Fluency and flexibility	Flexibility, originality, and problem restructuring	Problem sensitivity, causes guessing, problem restruc- turing, flexibility, and fluency

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coming up with off-beat analogies, metaphors, and empathic statements, as well as by restating potential solutions in terms of the original problem.

- 5. Force wide shifts of perspective by asking such questions as "What could be the opposite of the current solution?" or "How could we magnify or minify the solution?" or "Is there a radically different way of looking at the problem?"
- 6. Having generated a large number of ideas or solutions, identify the ones with the greatest potential by some sort of an assessment and selection procedure, such as a group voting on the ideas or solutions for picking out the three most promising ideas. Try to anticipate their weak spots and recast them.

Not only are these techniques of proven worth in creative problem solving, they are excellent as training devices for several creativity-related abilities. Practice with brainstorming can significantly increase fluency; with questions checklist, problem sensitivity and flexibility; with synectics, flexibility and originality, with breakthrough, problem sensitivity and problem restructuring ability.

These techniques, of course, have their limitations. For instance, none draws systematically upon the creativity-related ability of elaboration. Their use of originality, and with the exception of synectics and breakthrough, that of problem restructuring ability, is limited. Also, while they do ensure some freedom from mental blocks by deferring evaluation, they do not go far enough in tapping the vast reservoir of human motivation. None except breakthrough offers much expertise in defining ambiguous problems. Thus the challenge remains of developing technologies of creative problem solving that tackle really complex problems and more fully utilize the dazzling potential of the human mind.

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# Quiz

Assess the following statements.

I. Brainstorming means that ideas should never be evaluated.

 In attributes changing, it is best to identify some very concrete attributes of the object that need to be modified, and then try to generate several quite abstract alternative ways of satisfying each attribute.
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3.	Questions are the creative acts of intelligence.
4.	Synectics as a method is useful for solving problems of literature but not for solving technical problems.
5.	Constructive psychological strain is an impossibility.
6.	Relaxed alertness is an absurdity.
7.	Seeking an analogy for a problem situation in a very different field of knowledge is a way of creating constructive strain.
8.	Empathizing through personal analogies is an example of making the familiar strange.
9.	Book titles are useful for compressing thought.

10. Synectics finds useful fresh perspectives, not solutions, to problems.

11. "It is only the amateur or the novice who invents anything; the expert knows too many reasons why something can't be done, so he never tries."

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# MENTAL GYM

### **Brainstorming Exercise**

Try and list at least 10 ideas for each of the following problems.

I. What could be done to cut down crime in cities?

...........

2. What could you do to make life in general more fulfilling for you?

3. If as part of national service you had to 'adopt' a slum, what skills would you be able to teach the residents?

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4. If you have a young relative, how would you help him or her become more creative?

#### **Attributes Changing Exercise**

1. A powerful technique for improving product design is attributes changing. The listing of the modifiable attributes of a product—be it a commercial product, or a service, or even some activity—often leads to suggestions for improvement. So long as we think of a comb without thinking of the many properties of a comb, we are not likely to come up with better ideas about improving its design. But once we note that it must be light, easy to keep, easy to locate, easy to clean, durable, sharp enough to massage the scalp but not to hurt it, easy to handle, attractive in appearance, inexpensive, useful in other ways such as a ruler, capable of heavy as well as delicate jobs on hair, etc., a whole host of alternative designs, colours, materials, manufacturing processes, and so on may come to mind.

List the needed modifiable properties of the following common objects and activities. You may be surprised by the number you had not previously noticed. After listing attributes, select a few important ones and think of interesting alternatives for each attribute.

		MODIFIABLE	ALTERNATIVES
		ATTRIBUTES	FOR ATTRIBUTE
(a)	DICTIONARY	e.g., handling convenience	I. Pocket size
			2. Easy to make into a roll, etc.
(b)	PIN		

- (c) TRAFFIC CONTROL AT BUSY INTERSECTIONS
- (d) CONVOCATION
- (e) TROUSERS

2. Think of an object, service, or activity of interest to you. It may be some product or service your organization is marketing, or it may be some home appliance, or any other object or service. List its modifiable attributes as exhaustively as you can. Select a few important ones. Then think up as many potential improvements as you can by asking the question: "What are alternative ways for securing the functions performed or end served by each attribute?"

(About 3 minutes for listing attributes and identifying functions performed by them and about 5 minutes for thinking up improvements).

Name of the product, service, or activity:

Modifiable attribute	Function performed or end	Potentially better ways of
	serviced by attribute	performing function

#### **Questions Checklist Exercise**

- 1. Utilize the checklist of questions to suggest as many improvements as you can to the following products or processes.
  - (a) Bullock cart





2. Take a product or a process or an activity relevant to your work or study situation. Ask yourself the checklist of questions and try to come up with as many potential improvements as you can. (15 minutes)

Name of Product, Process, or Activity:

Questions	Potential Improvements
Add	
Subtract	
Alter components	
Rearrange	
Adapt	
Magnify	
Opposite	
Minify	
Other uses	
Alternative ways of producing	

#### **Synectics Exercise**

#### **Personal Analogies**

Analogies are productive sources of solutions to complex problems. The technique of creative problem solving known as synectics uses analogies heavily. One type of analogy that it employs is the personal analogy. If for example, you were the machine that had broken down, or the raw material that was giving trouble, or the union leader who was calling for a strike, or the customer who was refusing the goods, how would you feel-sense-see? Perhaps you feel jagged, and red, and all twisted inside, and the world is out-of-joint and filled with smoke... Let us see you try some personal analogies.

1. Suppose you are one of those princes turned into a frog by a witch. What do you feel-see-sense?

2. Suppose you are one of those servants caught stealing a dress and fired... What do you feel-see-sense?

3. Suppose you go to the airport to see a friend off. It is late at night, and a dark night at that. You chance to look at the searchlight scanning the sky and the surrounding terrain. So absorbed do you get that for a long moment you become the searchlight. What do you see-feel-sense?

# Symbolic Analogies

A type of analogy used frequently in synectics is called the symbolic analogy. It is a two or three word poetic or paradoxical phrase that arrestingly captures an event or an experience just like a striking book title or a headline. For example, Mahatma Gandhi's assassination could be described as 'peaceset', or 'the end of God', or 'bullet bereaved'. A simple act like eating breakfast could be described as 'slumber's smile', 'energy's beginning', or 'cracker chatter'. Let us see how many imaginative symbolic analogies you can think of for each of the following events, objects, or experiences.

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I. (	Corruption
2. `	Your childhood
3. /	A misunderstanding with a loved one
4	The first time you fell in love
5. `	Your job or course of study
sy Anal	logies

# Fanta

Many people consider fantasizing a waste of time; but not some psychologists and not the synectics people. By impregnating fantasies with appropriate themes, people's level of motivation can be raised. Sometimes people stumble on to remarkable discoveries during a reverie or a flight of fancy, as did Kukulé. During fantasy, we suspend our critical faculties, or ideas about the impossible, and so free our mind to romp to the desirable and the picturesque... and sometimes to the original and the profound. Let us see how richly and vividly you can fantasize.

I. What would happen if the moon splintered?

. . . . . . . . . . . . . . .

2. What would happen if animals could be crossed with plants?

What would happen if humans could be cloned cheaply? (Cloning is a process by

3. What would happen if humans could be cloned cheaply? (Cloning is a process by which many identical copies of a living organism can be made.)

#### **Direct Analogies**

What could be interesting and far-out analogies for the following types of situations?

I. A highway that keeps on falling into disrepair due to heavy traffic

...........

- ......
- 2. A boss who keep on blowing his top even at minor provocations

...........

- \*\*\*\*\*
- 3. The difficulty in many democratic societies of attracting competent, innovative, conscientious members to political parties

..........

4. The low returns on public sector investment

.....

# Excursion

Use the principles and mechanisms of synectics to identify fresh and potentially feasible approaches to the following questions.

1. In many competitive industries, management may dearly love to hire some people with ability to foretell—that is, learn through the means of extra sensory perception the future moves of competitors, government, etc. Such individuals

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are, of course, extremely scarce. Can some be trained? There is no known reliable technology for doing this. Can you think of a way (or ways) of increasing the management's capacity for foretelling?

..........

2. The economic growth rate of poor countries is much too low to raise living standards rapidly. There is no known technology for growing at 20% a year. Through synectics, can you identify some fresh but potentially feasible approach or approaches for growing at 20% per year?

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# Annexure A

# **Creativity Training**



Some of the readers of this book may wish to train others in creativity. I have personally found training others a very good way of enhancing my own learning. The 'principles' that underlie the training model I use are briefly outlined below.

#### I. Model of Creative Achievement

Creative achievement is thought to result from the *simultaneous* presence of four factors: (1) creative intelligence (see Chapter 11), (2) creative personality (see Chapters 12 and 13), (3) a

creativogenic environment (see Chapter 13); and creative problem-solving process (Chapter 10). If any of these four factors is weak, it may disproportionately depress creative achievement. Thus, training should aim at improving *all* of these factors, especially the ones that are very weak and therefore hinder a person's creativity. In addition, of course, techniques of creativity (Chapter 15) are very helpful in locating creative solutions for the practical problems of life.

Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime Chinese proverb

#### 2. Aim

What is being aimed at in creativity training is not creativity in just one activity or occupation, but in a broad range of human activities; not just one form of creativity, but all forms of creativity.

What is being attempted is the strengthening of the impulse to be creative in all areas of human activity, and for a long time—maybe for the rest of one's life, and to aim for even higher quality of creativity.

#### 3. Learning Model

Learning proceeds through the unfreezing of the person's attitudes and beliefs about creativity, his/her sense of clarity about the direction of change, and consolidation of change.<sup>1</sup> Data on personal abilities, blocks, motivation, etc., are gathered before the creativity workshop begins and fed back to the participants during the workshop as an unfreezing mechanism. Unconventional physical exercises in the form of energizers also tend to break down inhibitions. Initial readings heighten the awareness of the potential of creativity for personal growth, and serve as an unfreezing mechanism. The wide initial variation in the responses of the trainees in creativity exercises also serve as eye-openers to those whose divergent thinking capability is poorly developed.

Interpretation of test data fed back to the participant, and diagnostic exercises aimed at uncovering hurdles to creative functioning, help the trainee identify the path of change. This often means overcoming some blocks and disabilities, and/or improving some mental abilities like fluency or flexibility, and redesigning of one's social, work, and home environments. The trainees are helped to plan appropriate changes, keeping in mind short-, medium-, and long-term actions. There is also a build-up of personal awareness through additional readings and exercises. An open culture is created in which participants feel free to ask any questions and explore any ambiguity and share any view or feeling.

Consolidation ('refreezing') is secured by visible improvement in the trainee's creative problem-solving skills. Also, a culture of mutual help and constructive interaction is sought to be created through group exercises so that trainees reinforce each other's efforts to become more creative. Daily practice of skills through exercises is very helpful. Competition between trainees is not stressed, rather the trainee is encouraged to improve in relation to his/her creativity before the workshop. Often, creative guests are invited to talk informally about their lives, goals, successes and failures, and their electric quality powerfully reinforces the commitment of the trainees to become creative. Post-workshop test data are fed back to participants, and usually demonstrate much improvement. A one-day refresher course is commonly held a few months after the workshop for participants to share their post-workshop experiences. The basic concepts of creativity are also reviewed during the refresher course. This refresher course, too, is a powerful consolidator of newly acquired competence. There is also a post-workshop assignment to do something original and record and analyse the process. This also serves to consolidate creativity-related skills. Participants are encouraged to start brainstorming or creativity clubs, and to train other groups in creative problems solving. These can also help in learning well the basic



concepts of creativity. Finally, participants are encouraged to seek challenging tasks, creative friends, and creative hobbies and activities to provide a continuous stimulus to their own creativity.

## 4. Role of Trainer

The trainer's job is to structure experiences and learning in such a way that the model of creative achievement and the model of learning get internalized. Beyond this, the function is to create a non-evaluative climate in which participants experience an intense motivation to learn and change themselves. Constructive suggestions or voicing of disagreements on the part of trainees is encouraged. The trainer does not pretend to be the repository of all knowledge on creativity. On the contrary, the participants are encouraged to explore issues. The trainer does, however, supply them with appropriate information and models, and does help them arrive at insights and consensus. It is important for the trainer to emphasize the independence of the trainee to accept or reject any concept or model or approach that the trainer suggests.

# 5. Participation

It is very important to provide participation opportunities to trainees. One way to ensure this is to form groups, and give to each group the responsibility for a day's discussion of readings and the design of pertinent physical and mental exercises for the day. The learning goal or goals for the day are highlighted to the group, but subject to meeting the day's learning goals, considerable freedom is given to the group to design discussions, exercises, etc. There is a review session at the end of the day in which not only the activities and learnings during the day are reviewed but the class as a whole also provides feedback to the in-charge group about the way the activities were conducted. Whenever possible, an alumnus of a creativity workshop is assigned to the in-charge group as a resource person.

### 6. Time Management

A variety of diverse activities, each with specific learning goals, are planned during each day of the workshop. To be able to complete these, it is important to emphasize keeping to time schedules. While rigidity may be inappropriate, the point that activities should be well-planned so that there are minimal time overruns is worth emphasizing.

#### 7. Interest

Creativity workshops that I have conducted have ranged from two days to 10 days, depending upon the focus of the workshop and the needs of the participants. Interest is maintained through a variety of ways. First of all, there is considerable variety in the tools of learning. Readings, discussions of readings, quizzes, test data feedback, mental exercises, group exercises, 'energizers', meditation and relaxation exercises, simulations, case studies, chats with creative individuals, etc., provide considerable diversity in the tools of learning. Diversity is also provided by each in-charge group planning the day's activities distinctively. The participants themselves are a major source of stimulation as they share their problems, experiences, insights, and answers to quizzes and exercises. Finally, the diversity in the topics discussed in the workshop, ranging as they do from creative personality and divergent thinking to tools of creativity also sustains interest.

#### 8. Structure

The outline of a five-day workshop for training trainers is given below (readings may be assigned as appropriate).

CREATIVITY WORKSHOP		
Pre-tests		
Day I	Theme: Creativity and Creative Problem Solving	
9.00 a.m. to 9.30 a.m.	'Creative' introductions—each one shares a creative experience	
9.30 a.m. to 10.00 a.m.	Micro lab—creativity exercises in quick succession to provide glimpses of the workshop	
10.00 a.m. to 11.00 a.m.	Concept of lifelong creativity (discussion)	
11.00 a.m. to 11.30 a.m.	Beverages	
11.30 a.m. to 1.00 p.m.	Quiz and mental gym	
1.00 p.m. to 2.00 p.m.	Lunch break	
2.00 p.m. to 2.30 p.m.	Energizer (physical-mental exercises)	
2.30 p.m. to 4.30 p.m.	Discussion of creative problem solving and exercises	
4.30 p.m. to 5.00 p.m.	Beverages	
5.00 p.m. to 5.30 p.m.	Review, integration, and sharing of personal learnings and confusions	
Day 2	Theme: Creative Personality	
9.00 a.m. to 11.00 a.m.	Discussion of creative personality	



	Ma
11.00 a.m. to 11.30 a.m.	Beverages
11.30 a.m. to 01.00 p.m.	Quiz and mental gym
1.00 p.m. to 2.00 p.m.	Lunch break
2.00 p.m. to 2.30 p.m.	Energizer
2.30 p.m. to 4.30 p.m.	Data feedback on personality, discussion, and identification of needed changes
4.30 p.m. to 5.00 p.m.	Beverages
5.00 p.m. to 5.30 p.m.	Review, integration, and sharing of personal learnings and confusions
Day 3	Theme: Creative Intelligence
9.00 a.m. to 10.00 a.m.	Discussion of creative intelligence
10.00 a.m. to 11.00 a.m.	Quiz and mental gym
11.00 a.m. to 11.30 a.m.	Beverages
11.30 a.m. to 1.00 p.m.	Exercises on creativity abilities
1.00 p.m. to 2.00 p.m.	Lunch break
2.00 p.m. to 2.30 p.m.	Energizer
2.30 p.m. to 3.00 p.m.	Feedback on creativity abilities
3.00 p.m. to 4.30 p.m.	Exercises on creativity abilities
4.30 p.m. to 5.00 p.m.	Beverages
5.00 p.m. to 5.30 p.m.	Review, integration, sharing of personal learnings and confusions
Day 4	Theme: Techniques of creativity
9.00 a.m. to 10.00 a.m.	Discussion of creativity technology
10.00 a.m. to 11.00 a.m.	Quiz and mental gym
11.00 a.m. to 11.30 a.m.	Beverages
11.30 a.m. to 1.00 p.m.	Practice with brainstorming
1.00 p.m. to 2.00 p.m.	Lunch
2.00 p.m. to 2.30 p.m.	Energizer
2.30 p.m. to 3.30 p.m.	Practice with attributes changing
3.30 p.m. to 4.00 p.m.	Practice with checklist of questions
4.00 p.m. to 4.30 p.m.	Beverages
4.30 p.m. to 5.30 p.m.	Practice with 'breakthrough'
5.30 p.m. to 6.00 p.m.	Review, integration, sharing of personal learnings and confusions
Day 5	Theme: Creativogenic Environment

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9.00 a.m. to 10.00 a.m.	Discussion of creativogenic environment and choices
10.00 a.m. to 11.00 a.m.	Quiz and mental gym
11.00 a.m. to 11.30 a.m.	Beverages
11.30 a.m. to 1.00 p.m.	Simulation on dealing with a hostile environment
1.00 p.m. to 2.00 p.m.	Lunch break
2.00 p.m. to 2.30 .m.	Energizer
2.30 p.m. to 4.00 p.m.	Review, integration, implications, planning personal changes, and sharing
4.00 p.m. to 4.30 p.m.	Beverages
4.30 p.m. to 6.00 p.m.	Post-tests

#### 9. Energizers

The energiser is a short (say half-an-hour) duration burst of invigorating physical and mental activity. Initial energizers break down inhibitions. Energizers are focused on the day's theme(s), and provide a relatively non-cerebral method of learning. They also provide stimulation to many senses besides the mind, and an arena for the in-charge training group to exhibit its creativity. They also energize, that is, by providing vigorous physical exercise, they get rid of physical and mental fatigue. A typical initial energizer to get people introduced to one another and to provide them with a glimpse of the workshop is given below.

- Item 1: Form a circle and go around. Stop. Find a partner. Talk to each other in languages neither of you know.
- Item 2: Form a circle. Go around. Faster. Stop. Find a fresh partner. One of you express fear in five different ways; the other, express delight in five different ways.
- Item 3: Form a circle. Go around. Run. Reverse. Stop. Find a fresh partner. One of you list six uses of your left foot's big toe; the other, six uses of your right ear.
- Item 4: Form a square. Run. Stop. Find a fresh partner. Tell each other four changes you want in yourself.
- Item 5: Form a rectangle. Run. Crawl. Stop. Find a fresh partner. One of you tell the other the opposite of a coin; the other, the opposite of gum.
- Item 6: Be a gas cloud. Drift in it. Stop. Now simulate an implosion. Explode like the Big Bang.
- Item 7: Form a circle. Run. Revolve. Stop. Find a fresh partner. One of you is the sun, the other the earth. Tell each other what you feel-see-hear-think.



- Item 8: Form yourselves into a river. Flow. The terrain is rocky. Now there is a plain. Now there is a delta. At last the sea. Simulate a stormy sea.
- Item 9: Form an eight. Run. Clap. Stop. Find a fresh partner. One of you describe a close friend only through verbs; the other, only through adjectives.
- Item 10: Squat. Move like tortoises. Change into lizards. Now into snakes. Now into creepers. Now into trees. Now into pregnant women. Now into babies. Now into creators.

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