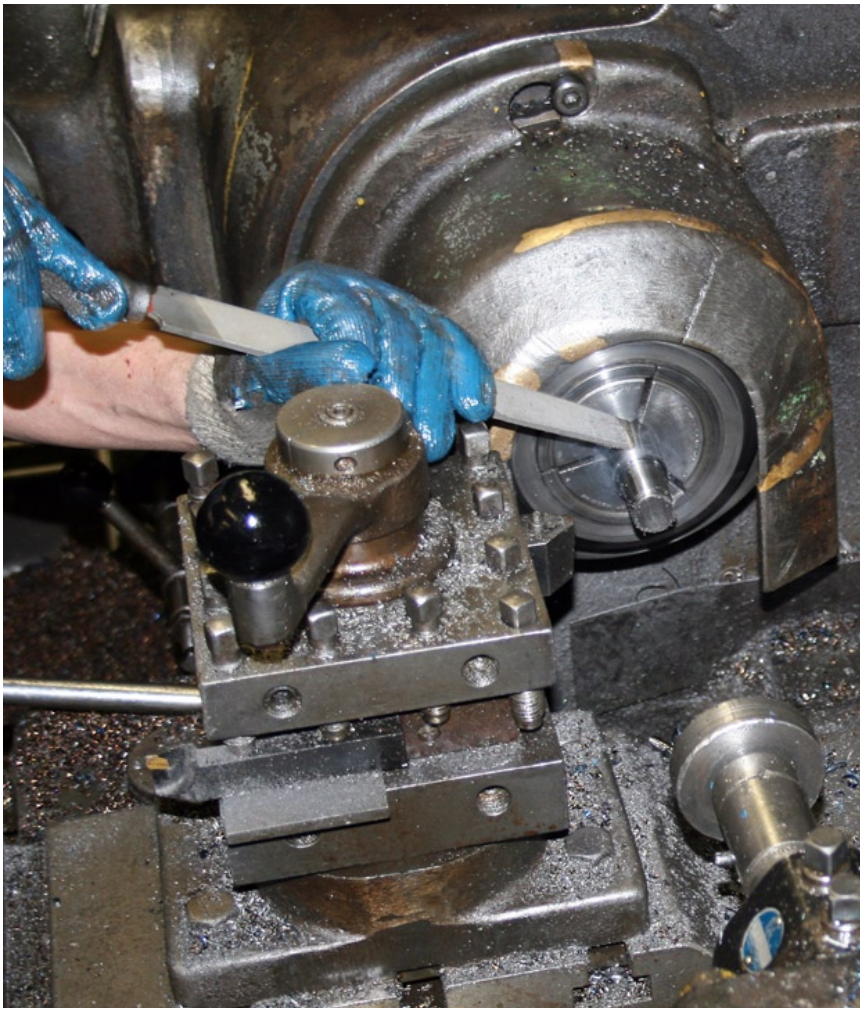
ISSUE SIXTY

the CrossFit JOURNAL

August 2007



Where Barbells Come From

Marty Mitchell, with Mark Rippetoe

The bar is the heart and soul of barbell training. A good bar is the most important piece of gym equipment you will use in a correctly designed strength training program. If you are buying it for your home gym, it is the purchase that will have the greatest bearing on the quality of your training experience. A cheap bar is not a pleasure to train with, and it may make some of your more critical exercises more difficult to do. You can't clean or snatch any real weight with a bar that doesn't spin dependably. And you can't train heavy with a bent bar, or a bar that might actually fail under a load. Anyone who has trained for any length of time in a commercial gym has grown fond of a certain bar in the rack, and might even be inclined to wait for it if it's being used by someone else. Bars have different

continued page ... 2

Where Barbells Come From

...continued

characteristics, and lifters develop a taste for certain types. Buying one for your home gym should be a careful process since you'll be using it every time you train.

Barbell varieties and variables

The type of bar you buy should be determined by what you want to do with it. Many factors play into the quality of a bar, and understanding them is important to the informed consumer. Olympic weightlifting bars are produced in training and competition grades and are designed to comply with International Weightlifting Federation specifications regarding markings and dimensions. They are made to be springier and more lively—"whippy" is the term usually used—than other types of bars, because of the dynamic nature of the snatch and the clean and jerk. Powerlifting bars, again in either training or competition grade, are stiffer than weightlifting bars, since bar oscillation is not desirable in the squat, bench, or deadlift. Specialized thicker bars for squats and longer bars for deadlifts are available and used in some federations. "Multi-purpose" bars are produced for generalized strength training, gym use, and the institutional and scholastic markets. The surface of the bar can be finished in a variety of ways: chrome, zinc, black oxide, or unfinished, or stainless steel can be used. Thicknesses vary from 25mm for women's weightlifting bars to 1 3/8 inches for squat bars, on up to 3 inches for specialized fat bars designed for grip training. The most common length for general-purpose bars is 84 inches (7 feet) but they are available in lengths of 72, 60, and 48 inches for specific needs. They come in a variety of weights, from 5kg to 60 pounds, with varied knurling depth and marking options; with bolt, snap ring, or roller pin retainers; with bushing or needle-bearing sleeves; of domestic or foreign manufacture; and with expensive, mid-range, or economy pricing. To further complicate the selection process, bar strength is measured in at least three ways: tensile strength, yield strength, and test ratings of 2000, 1800, 1500, 1200, 1000, 700, and 500 pounds. Prices range from less than $100 to around $1000, and the differences among the offerings across that range can be mind-boggling for someone just trying to outfit a home gym or small training facility.

The powerlifting market has expanded rapidly over the past decade, with many sanctioning bodies and an accompanying range of rules and regulations that permit a variety of equipment to be used in competition. This creates a market for both competition and training equipment. Eight-foot squat bars with larger diameter shafts are now available that deform very little under the heavy loads modern powerlifting equipment permits lifters to handle. Longer-than-standard deadlift bars permit the wide stance used in Sumo-style deadlifting, are thinner for gripping purposes, and offer more flexibility in the bar to assist the pull from the floor. Stiffer, thicker power bars are available for bench pressing. These specialty bars are designed for competition, although sales are increasing steadily to serious trainees as well. Most companies offer a power bar suitable for all three lifts, an economic necessity for the school market and its increasing participation in the sport.

The byproducts of turning down the steel.

A bar shaft is turned down to size.

The knurl is applied to a bar shaft.

Where Barbells Come From

...continued

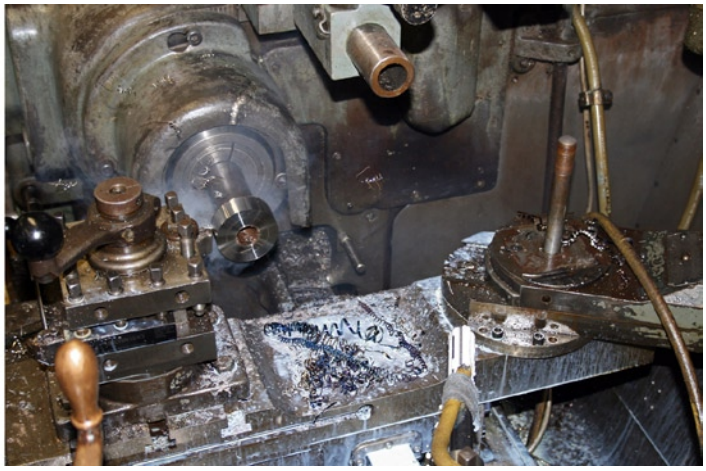
Olympic weightlifting, however, has one international governing body and one set of equipment specifications. Several manufacturers produce bars for competition and training, with separate dimensions for men's and women's equipment. In most cases the grade and style of a given manufacturer's men's and women's bars are very similar, if not the same. The major differences are the weight (20kg for men and 15kg for women) and diameter (28 mm for men and 25 mm for women). The International Weightlifting Federation inspects and approves bars and equipment certified as officially acceptable for international competition; at any given time there may be up to three manufacturers of IWF-certified barbells. China alone has over one million registered weightlifters, and the market for quality equipment there is potentially huge. Competition bars are typically very expensive, made with very high-quality steel and roller bearings, and can cost nearly a thousand dollars each. More affordable but still high-quality bars are available for training purposes, often made with bushings instead of bearings and with less expensive steel. For training novice lifters and children, lighter bars are available in 10kg and 5kg sizes.

Weightlifting bars are smaller in diameter than powerlifting bars. A smaller grip surface is necessary to allow the fast rotation of the bar, since the smaller diameter rotates at a higher angular velocity, and the smaller diameter makes it easier to assume the hook grip favored by weightlifters. A smaller diameter allows for greater bar flexibility, which facilitates the "whip" desirable in cleans, jerks, and snatches, but it also requires a more expensive higher grade of steel. Powerlifting bars need some, but not much, rotation. An all-purpose powerlifting bar will be thicker than a weightlifting bar. Whip is not an issue as the bar is carried in the palm, with closed fingers, or on the back during a lift. In fact, a squat and bench press bar must be "deader" than a weightlifting bar, because 800 pounds on a whippy bar causes bar oscillation during the lift that interferes with stability.

There are also a variety of general-purpose bars made for strength training for athletes, recreational lifters, and team sports conditioning. Health clubs, high schools, and home fitness enthusiasts may prefer a general-purpose bar to accommodate budget constraints and the wide range of uses the equipment will see. For these users, four good bars may be perceived as a better investment than one great bar. A major bar manufacturer may offer over forty different styles of bars for sale to wholesalers. And customization is now a growing trend, with specialty requests for knurling patterns and marks, sleeve lengths, and special bar sizes for individuals and organizations. The list of domestic and international high-quality bar manufacturers includes Power Place Products, Ivanko, York, Chapman, Eleiko, Leoko, Uesaka, Werksan, Zhangkong, Texas Power Bar, and Solid Bar.

Bar strength measurements

The raw materials and components of a quality bar do not come from the local hardware store. Shaft steel is a specialty item, produced by a few manufacturers with the ability to control all



The outside flange of a sleeve is turned to size

A sleeve receives finishing on a lathe.

A DOM sleeve is fitted with a flange.

Where Barbells Come From

...continued

the variables that affect the way a loaded bar behaves, and most of it is imported from China and Canada. Sources are not as readily available as manufacturers would like. A materials purchaser who spends too much time bargain-hunting may be exercising poor judgment, since bar steel is the most important aspect of the finished product. When choosing bar stock, a manufacturer will search for a specific blend of properties, among them the ability to accommodate the machining processes that the shaft must undergo to become a bar.

Perhaps the most important properties of bar stock will be tensile strength and yield strength. Both of these characteristics are measured in psi, or pounds of force per square inch, and information about these two parameters is usually associated with weightlifting bars. One psi is defined as a force of one pound applied to an area of one square inch. Tensile strength is defined as the amount of stress (in psi) a material can take before breaking. The quick and easy way to select a bar is to buy the highest tensile strength you can find.

But equally important is yield strength, which refers to the amount of stress (again in psi) that a material can take without undergoing permanent distortion. This distortion is known in engineering as "plastic deformation," as opposed to "elastic deformation," which is a material's ability to deform and return to its original configuration. Steel with very high yield strength has a very high threshold of plastic deformation, below which it will exhibit elastic deformation, always returning to straight when unloaded. In the simplest terms, you can think of tensile strength as essentially resistance to breaking, and yield strength as resistance to bending. The higher these two measures of bar strength are—and the closer they are together—the better the bar.

Understanding this is critical. For example, a bar with a tensile strength rating of 195,000 psi and a yield strength rating of 120,000 psi will be next to impossible to break, but, in time, after some heavy squats, deadlifts and shrugs, you will notice a permanent bend or bow. On the other hand, a bar with a 195,000 psi tensile strength rating and a 175,000 psi yield strength rating will turn you into a lifetime customer for that wise, careful barbell manufacturer. As it turns out, information on yield strength is not as readily available as tensile strength info. The knowledgeable buyer will ask for both.

To muddy the waters, powerlifting bar manufacturers commonly use pound-test ratings such as 1500-pound test, 1200-pound test, etc., with the higher pound-test rating being better. Higher-end manufacturers use the more informative index of tensile and yield strength, the best reference a buyer can look for when determining bar strength and performance. Pound-test ratings for bars are established in a static manner, with the bar supported under the specified load with no bouncing or dropping. An example of this test might be a forklift with the forks set under the bar in a grip width position, holding the bar loaded to 1500 pounds off

A DOM sleeve is checked for size.

A snap-ring sleeve assembly.

Where Barbells Come From

...continued

the ground for a specified time. Upon unloading, if there is no permanent distortion or bend, the bar is rated as a 1500 pound test bar. A good 1500 pound test bar should be in the vicinity of 150,000 psi tensile and 130,000 psi yield strength. Again, though, this is a *static* test, and is not appropriate for a bar that will be used under dynamic loading conditions. If a manufacturer relies on a pound-test rating and you want more information, ask about the tensile and yield strength for the bar.

The manufacturing process

The first step in the process of barbell manufacture is to cut the bar stock to length. Once this is done, machining processes are involved in nearly every production step. Machining involves very expensive, technologically-advanced factory equipment that removes metal from the raw piece. These processes are generally time-consuming and skilled-labor-intensive. During the primary machining process that a bar undergoes, raw bar stock is "turned" or machined down to size. When it reaches the desired thickness, it is checked for straightness to very low tolerances, and some bars may need to be mechanically straightened in a press to meet tolerance levels. The bar is also checked for other defects such as cracks, pits, pots, and corrosion. Some manufacturers use X-ray technology to check for internal abnormalities.

Creating the knurl—that rough, checkered surface that marries the bar to your palms, fingers, shoulders, or back—is a slow, complex, tedious process. Knurling is a pressing process; the knurl is pressed, rather than cut, into the steel. There is no such thing as a standard knurl. There are different markings for power bars than for weightlifting bars, and different knurl depths to accommodate gripping preferences, with knurls usually separated by smooth unknurled spaces in the skin-contact areas of the bar. There are many types of knurling patterns that vary with the intended purpose of the bar, the most common variant being the presence or absence of a center knurl, as well as the width of the smooth unknurled center and the lateral extent of the knurl toward the sleeve. Knurling coarseness is determined by the size of the pattern—i.e. the size of each individual little square—and by the depth of the pattern—shallow, medium, or deep. There are diverse types of manufacturing equipment used for this process: scissor-type knurlers, plunge systems, and traveling knurlers. Some knurls are rolled after pressing to reduce the sharpness of the points, and some are left sharp for greater friction against the hand. It is a critical process and one that significantly affects the "feel" of the bar in the hands of the lifter.

The finish—the coating or lack thereof—applied as a final step is the main factor controlling the appearance of the bar. Finishing choices of chrome, zinc, or black oxide are available from most manufacturers. Finish is usually applied in-house, though in some cases it may be farmed out to a company that specializes in finishing. Some manufacturers also offer stainless steel bars, which require no finishing process and remain permanently rust- and corrosion-free. This type of steel is the best, but it is also the most expensive. Stainless steel bars are rated for tensile and yield strength in the same way as other steel bar stock, but the cost is two to four times higher than that of regular steel. And since the harder steel is more difficult and time-consuming to machine, stainless bars are often prohibitively expensive.

A sleeve is fitted to the bar shaft.

Bar shaft stock and finished bar shafts in the rack.

The importance of the finish for the typical fitness market is mainly aesthetic. Fitness clubs generally prefer the brightness of chrome or zinc. Others might prefer the longevity (but not the cost) of stainless steel. The performance markets—athletics and competition—hold a different view on the finish of a bar. Black oxide is accepted as a good "tacky" grip for powerlifters. Zinc or stainless may be preferred by weightlifters wanting a slightly smoother grip. Chrome doesn't hold chalk as well, but it cleans more easily after use or when bloodied during a pull.

Where Barbells Come From

...continued

The sleeve is the part of the bar on which the plates are loaded. It is made out of a material known as Drawn Over Mandrel (DOM) tubing, a type of machine tubing that is made out of flat stock, rolled into a pipe configuration and then pulled through a die under pressure and rotation that ensures its straightness, strength, and internal integrity. The sleeve houses the components that allow the plates to rotate as it spins on the shaft. It can be finished with fine grooves or left flat, depending on the plate-sliding characteristics desired. The raw tubing is machined down to the desired diameter for loading the plates, with a larger-diameter flange left at the inside edge of the sleeve to stop the plates and hold them still when collared. The configuration of the sleeve is one of the features that visually distinguishes various manufacturers' bars.

Sleeve rotation in a high-quality bar is facilitated by either a bronze or steel bushing system or by precision needle bearings. Older bars were sometimes produced with ball bearings, but needle bearings have largely replaced this less-satisfactory method of producing a fast-spinning bar. Bushings are less expensive but tend to wear down faster than needle bearings if they are not lubricated occasionally; soft needle bearings can flatten when dropped wrong and cause the bar to stop spinning altogether. However, well-maintained bushings work just as well as needle bearings, and the cost savings may be substantial; old York Classic bars spin amazingly well when they are adjusted properly and the inside and outside bushings are oiled with a drop of 3-in-1 oil. Modern bars are available with sealed sleeve assemblies, though, and a maintenance-free bar may be a good thing to have in a busy institutional situation. Different sleeve assembly systems have different spin characteristics; some allow a slow, smooth spin for a squat, or a quick, free spin for a clean or snatch. Sleeve assembly is a precision process, and much like a protected secret family recipe, the precise details are usually proprietary information.

Finally, the sleeve assembly may be held in place in several ways. The most common three are snap rings, roller pins, and bolts. Snap rings are generally the preferred method, since they are not exposed to the platform and, at least in theory, cannot fail. Spring tension holds them in place in a groove cut into the internal diameter of the end of the sleeve. Roller pins were used to assemble York bars for decades, and they work well too since they cannot spontaneously loosen, but they can shear if the loaded bar is dropped hard on the end. Bolts of any kind are the mark of a cheap, inferior product. In time, continuous rotation of the sleeve, the impact of dropping the bar, and the inevitable lack of maintenance loosen the bolt. The wreck caused by a loaded sleeve sliding off the bar during a heavy attempt can be spectacular and very dangerous to both lifter and spotters.

Producing high-quality weightlifting and powerlifting bars is far more complex than it might seem at first glance. As is true of most precision production processes, much detail, expense, and expertise is involved to get it right. Solid, trustworthy bar manufacturers have given us what we need and what the modern market demands: top-quality bars for every conceivable weight room purpose. We can either pay them for safe, strong, reliable bars that will keep producing PRs over a long period of time, or we can keep tightening the sleeve bolt of a cheap sports-superstore bar until it strips and falls off during a 450-pound squat.

Marty Mitchell is a sales rep for various strength equipment and supply companies. With major focus on the pro, college, high school, and military markets, Mitchell designs and develops equipment for athletic enhancement. In the past he has also manufactured basic strength equipment. As a hobby he trains Pennsylvania athletes at the high school and college levels.

Mark Rippetoe is the owner of *Wichita Falls Athletic Club* / *CrossFit Wichita Falls*. He has 28 years experience in the fitness industry and 10 years as a competitive powerlifter. He has published articles in the *Strength and Conditioning Journal*, is a regular contributor to the *CrossFit Journal*, and is the coauthor of the books *Starting Strength: A Simple and Practical Guide for Coaching Beginners*, *Practical Programming for Strength Training*, and the forthcoming *Basic Barbell Training*. *Starting Strength: A Simple and Practical Guide for Coaching Beginners*, *Practical Programming for Strength Training*, and the forthcoming *Basic Barbell Training*.

The First CrossFit Games

Dale Saran

Arrival—June 29

I drop my bags in my hotel room and decide to head back out to get something to eat. It's getting late and I've been traveling since 0430. As I pass the desk, I see a group of people walking out to the parking lot, as well, a loose mix of men, women, and kids. I am almost certain they are CrossFitters. The CrossFit Games begin tomorrow morning, and the women in this group look fit—not Swiss Ball, step-aerobics, Kate Moss-type fit, mind you, but pull-up, clean-and-jerk, kettlebell-swing fit. Nice.

After dinner I get lost on a reconnaissance of the Games' location—I drive right by the road that the games are on. As I run out of sunlight, I finally find the site and get a brief glimpse of where the Games will be: the giant pull-up bar station on the side of a warehouse-looking building is the giveaway. My hands itch involuntarily. My calluses aren't where they need to be, as I've taken a few weeks off due to some injuries and a jiu-jitsu tournament a week ago. Darn.

Back in my hotel room, I'm a little anxious as I lie in bed staring at the ceiling. I really should relax. I have no illusions about winning anything. I have been doing CrossFit and posting on the WOD blog for over a year and a half now, and these same people that I have been watching on video clips, reading about in workout time posts, and learning from, are a class above me in fitness. I just don't want to embarrass myself. *Please let me not finish last*, I think as I doze off.

Day 1

I arrive about 45 minutes early and register. I recognize a number of CrossFit luminaries; these are people I feel that I know in some way, but I suppress the urge to address them by name. Eva Twardokens checks me in. We've met once before at Mike Burgener's gym. She is friendly and asks me about my CrossFit Total. I'm a bit taken aback. I look at the sheets of paper to find out which heat I will be in for the first event, the Hopper workout. I can't help myself and I look through every name on the men's list—Josh Everett, Brendan Gilliam, Brett Marshall (aka "AFT"), James Fitzgerald ("OPT"), Connor Martin (son of BrandX owners Jeff and Mikki Martin), and more. I note that I am *not* in the same heat as most of these guys and breathe a little sigh of relief.

I see Nicole Carroll, introduce myself to video guru Tony Budding, and say hi to Josh Everett. It is a slightly surreal experience to meet someone who does not know you but whom you have watched over and over again, studying their form, marveling at their intensity and athletic accomplishments. In this same vein, I manage to get a case of athlete's mouth when I start talking about Brett Marshall's 2:19 "Fran" to a guy a little smaller than me (and I'm only 5'6") and his wife and daughter—only to find out that it is Mrs. Marshall and her husband Brett himself.

I hate being stupid.

At the first opportunity, I introduce myself to Coach Glassman. I try to shake his hand, but he hugs me as if we are old friends and I turn red and stammer. I am trying to thank him, but I can't because he keeps thanking me for coming. It is this spirit that dominates the Games.

The "crusher"

Dave Castro has been acting as the "proctor" for the Games and ensuring everyone gets the instructions and information necessary. When the colored ball gets pulled from the hopper (an improvised peanut roaster), Dave announces "Push-Jerks, Heavy." For me, not too bad. Concept 2 has donated eighteen model "D" rowers for the Games, and the sturdy bars on the cement platform make clear what the other events will be—rowing and pull-ups. The numbers go up on the board: row 1000 meters, followed by rounds of 25 pull-ups, and 7 push-jerks with 135 pounds for men and 85 pounds for women. I'm fluid with numbers and I immediately think of the symmetry of 4 rounds, which would round out to an even 100 pull-ups. When a "5" goes up next to the rounds, my mouth gets a little dry. When Dave announces that there is a 20 minute maximum-time cutoff, it gets drier. Anybody got something to drink?

A play-by-play of the events and results wouldn't do justice to the intensity of all of the competitors, male and female, young and old. Ripped hands were a given from the pull-ups, as were people slumped over gasping for oxygen, and others trying to shake out their arms for just one more push-jerk or pull-up. I can say that the strongest impression I have of that event is that oft-overused (but actually apt here) word that is a mantra for Coach Glassman: *intensity*. No one quit—or even went easy—on that workout.

The First CrossFit Games

...continued

The trail run

After a few hours to rest and to let the heat of the California sun dissipate a bit, the next event is the trail run, a roughly 5-kilometer test of will (and leg) power. The run begins with a long straightaway on a road, to allow people to spread out before returning to the base of the hill for the first of four brutal ascents. The run goes up the face of the hill, down the back side, then up the back and down the face, rinse and repeat until unable to move legs. Then finish with the same gentle incline on the road and back to the finish/start line.

By the end of the day's second event, the truly elite men and women had made their mark in both of the first two events. A spirit of camaraderie and friendly competition dominated both events. I drag myself back to my hotel room for a hot shower, dinner, and a trip to the pharmacy for something to hold my hands together for the next day's CrossFit Total.

Day 2 – The CrossFit Total

Mark Rippetoe, co-author of *Starting Strength*, creator of the CrossFit Total, and all-around friend of CrossFit, provides instructions for the day's events. There are multiple lifting stations, both indoors and out, and the top ten finishers from day 1 will lift inside under the watchful eye and quick wit of Coach Rippetoe. Volunteers do an excellent job of swapping plates and setting up the bars, while outside things are decidedly less formal. Nicole Carroll "judges" while at the same time jumping up and down and screaming for someone to complete a lift. "COME ON! PUSH!" Too bad they don't do more of that at other competitions.

Camaraderie and fun are the primary impressions I have of that day. People are helping each other, cheering each other on, urging each other to bigger lifts, sharing chalk, offering tips for both the new and the more veteran lifters. And some big weights get lifted. I am a spotter for a back squat of more than 500 pounds (Man, am I glad he made that!) and an over-500-pound deadlift.

A fitting culmination of the event is Josh Everett as the last lifter, with everyone else having completed their lifts and watching, as he attempts a deadlift in the vicinity of 575 pounds. It is a truly monster effort. Ultimately, he doesn't make the lift, but the build-up, the excitement, Josh pacing and having the weights switched, is one of the great moments of the weekend.

Awards and rewards

I do not want to give short shrift to the winners, but neither do I want to simply list their accomplishments, which have already made the rounds in the CrossFit family and speak for themselves. Those who finished in the top are, without argument, truly "CrossFit" and elite athletes. Their performances and results were awe inspiring.

No less awe inspiring for me, however, were the *efforts* put in by every CrossFitter there, new and veteran, young and old, female and male. Every single competitor gave their absolute all and distinguished themselves by their competitive spirits, their easy smiles, and their zeal for the pursuit of elite fitness.

My congratulations to everyone—to all the athletes who participated and, especially, to the volunteers, trainers, coaches, and family members who came to support the athletes and ensure that the first-ever CrossFit Games was a tremendous success. Hope to see you all there again next year!

◇

Dale Saran has been a Marine officer since 1991. He is a Cobra pilot and Judge Advocate, now a mobilized Reservist, and will return to private law practice this coming October. He lives in New England and has been CrossFitting since November 2005.




Reading Between the Lines

Dave Castro

One week after the CrossFit Games I was sitting around CF Santa Cruz and the topic of the top three male competitors came up. Someone marveled that they all performed at such high levels. As the discussions gained some steam I wondered to myself what they all have in common in the performance arena. The first thing that came to mind was the benchmark workout known as "Fran" (three rounds, at 21, 15, and 9 reps, respectively, of 95-pound thrusters and pull-ups). I knew for a fact that all three of them had a sub-3:00 "Fran" time. So I wondered what other benchmark performance numbers they put up. What does it take to compete with these three? What are some constants in their performances? And, are there certain benchmarks workouts and exercises that act as indicators (and predictors) of broad fitness and capacity across diverse domains?

The guys

Brett Marshall (known as "AFT") and James Fitzgerald ("OPT") flew in from Canada to compete in the Games. Marshall burst into the realm of the CrossFit elite with his sub-2:00 time on "Diane" (three rounds, 21, 15, and 9 reps, of 225-pound deadlifts and handstand push-ups). His training partner, Fitzgerald, is equally impressive. Josh Everett, the head strength and conditioning coach for UC Riverside's athletic teams—drove up from Southern California. He is well known in the CrossFit world for his lifting prowess, his broad fitness, and his epic battles against Greg Amundson at "Fran."

Marshall, 33, stands 5'5" and weighs 150 pounds; Fitzgerald is 33, 5'10", and 164; and Everett, 32, is the heaviest of the three at 5'9" and 183.

The games

The first event, the Hopper, was won by Marshall. He dominated the workout, which consisted of a 1000-meter row followed by five rounds of twenty-five pull-ups, and seven 135-pound jerks. Fitzgerald took second, and third went to Chris Spealler from Salt Lake City. Everett rounded out the group in fourth place.
The second event, the off-trail run, saw Spealler winning and Fitzgerald again taking second. Marshall came in third, and Everett finished in the top ten.

After day 1 it looked like the contest was going to be all about Fitzgerald, Marshall, and Spealler. But the strength stuff was still to come. Sunday was devoted to the CrossFit Total event, which tests the lifters' max squat, overhead press, and deadlift. And Everett is legendary in the CrossFit community for his strength. The Games ended with his 570-pound deadlift attempt. It came off the ground, but it was too much for him to finish on that day. Everett's combined score of 1133 earned him second place in the Total, behind Connor Banks, who scored 1225 (including a 540 squat!). Fitzgerald and Marshall finished 11th and 13th, respectively, which was enough to bring Everett back into the running for the Top CrossFitter title.

When all the points were tallied, Fitzgerald had been consistent enough to win the title of Top CrossFitter, placing high in all three events. Marshall came in a close second, and Everett was right behind in third. It was a close and exciting finish, just as we all thought it would be.

The "girls"

So how do these guys' CrossFit benchmark numbers measure up? How do they perform on the classic workouts known as "the girls"?

What surprised me is how close their numbers actually are.
As I've already mentioned, I knew they all had sub-3:00 "Fran" times. Marshall holds the current confirmed record for Fran, at 2:19. Everett has a just slightly slower PR of 2:25, and Fitzgerald's nest clocks in at 2:44.

Everett consistently cranks out "Helen" (3 rounds of 400-meter run, twenty-one 24kg kettlebell swings, and 12 pull-ups) in under 8:00, with a PR of 7:29. Fitzgerald's PR is 7:47, and Marshall was not sure of his exact PR, but said it is around 8 minutes. So, now we need to have a sub-3:00 Fran and a sub-8:00 Helen to compete with these guys.

What about something with bodyweight movements only? "Cindy" is a good measure (max rounds of 5 pull-ups, 10 push-ups, and 15 squats in 20 minutes). Everett can crank out 28 rounds, while both Fitzgerald and Marshall do over 30 (Marshall's PR is a serious 36 rounds!)

"Linda" (aka "Three Bars of Death") was another workout I was interested in comparing, as a measure of the ability to move big loads in a short time period. "Linda" consists of ten rounds of 1.5 times bodyweight deadlift, bodyweight bench press, and .75 bodyweight clean, with each round one rep shorter than the last (the rep sequence is 10, 9, 8, 7, 6, 5, 4, 3, 2, 1). Their times are nothing short of amazing. Everett knocks out all this work (275-pound dead, 183 bench, and 138 clean) in a mere 12:23. Fitzgerald is just behind him with a time of 13:44 (at loads of 246, 164, and 123 pounds). Then there is Marshall. He weighs 150 pounds, but he chooses to base his loads for "Linda" on a hypothetical 200-pound body weight. For his version of "Linda," he deadlifts 300 pounds (twice his actual body weight), benches 200 (1.3 times actual weight), and cleans 150 (body weight). All of this takes him just over 30 minutes, which is an impressive time even when done at the prescribed weights.

Reading Between the Lines

...continued


James Fitzgerald


Brett Marshall


Josh Everett

	James Fitzgerald ("OPT")		Brett Marshall ("AFT")		Josh Everett	
Overall						
CrossFit Games Result	1st place	272 points	2nd place	270 points	3rd place	267 points
Hopper	2nd		1st		4th	
Run	2nd		3rd		10th	
CrossFit Total	11th		13th		2nd	
Personal stats						
Height	5'10"		5'5"		5'9"	
Weight (lbs)	164		150		183	
Age	33		33		32	
CF benchmarks						
Fran	2:44		2:19		2:25	
Helen	7:47		8:00		7:29	
Cindy	30.3		36		28	
Linda	13:44		30:00 @ 200lbs		12:23	
Lifting numbers		% bodyweight		% bodyweight		% bodyweight
Deadlift	459	2.79	400	2.6	569.8	3.11
Squat	343	2.09	395	2.63	440	2.4
Clean and jerk	198	1.2	230 clean, 240 jerk	1.5/1.6	346.5	1.99
Snatch	158.4	0.96	187	1.24	268.4	1.46
"Gymnastics" numbers						
Max pull-ups	45		60		62	
Max muscle-ups	12		10			
Run times						
100m	11.58				11	
400m					50	
800m					2:11	
1600m					5:00	
5k	18:30		18:45		20:19	

Reading Between the Lines

...continued

Moving steel

There is no doubt that they all can perform a wide variety of functional movements executed at high intensity very well. But how strong are these guys? Are they just metabolic freaks?
As suggested by their work on "Linda," the answer is a resounding no.

All can deadlift over 2.5 times their body weight. Everett has the highest deadlift of the 3 with a PR that is over three times his body weight—569.8 pounds! Fitzgerald's PR is 459 and Marshall's 400.
They also have substantial back squats. Twice-bodyweight squats are not an issue for any of them. Marshall can lift more than 2.5 times bodyweight with a 395-pound back squat. Everett can squat 440, while Fitzgerald lifts 343.

In the Olympic lifts, Everett, who trains for Oly competition, dominates, with an almost double bodyweight clean and jerk. Marshall is also very competitive with a clean equaling 1.5 times his body weight. When it comes to the snatch, Everett again prevails, able to get almost 1.5 times his weight (268.4 pounds) overhead. Marshall is close behind with a 1.24 times bodyweight snatch of 187 pounds. Fitzgerald is just under a bodyweight snatch, with a 158.4-pound lift.

Track work

5k times for Marshall and Fitzgerald are very close. Fitzgerald runs an 18:30 and Marshall an 18:45. The larger Everett has a time of 20:19. Everett is the fastest of the three in the sprint distances, though, with a 50-second 400m.

Nutrition

Everett tries to eat roughly 3500 calories a day in a Zone-conforming 40/30/30 (percent of calories from carbs, protein, and fat, respectively) balance. His dinner usually is larger than 5 Zone blocks.

Marshall calls his diet an "unmeasured" Zone diet.
Fitzgerald's diet is composed of all organic foods. Meats, vegetables and oils make up most meals, although "cheat" days incorporate rice and pastas.

Training

Fitzgerald and Marshall both religiously do the WODs as posted on the CrossFit.com website. Chris Spealler, who won the run event, also does just the posted WODs. The top three finishers in the run event (Spealler, Fitzgerald, and Marshall) are pure main site CrossFitters. The CrossFit WOD only rarely calls for runs, much less hilly runs of unspecified distance, yet these three still took home the trail run medals.

Prior to starting CrossFit, Marshall trained with isolation movements and traditional resistance training with an occasional functional movement thrown in. Fitzgerald trained with a mixture of Westside, Poliquin split, and strongman work, along with sprinting and running. In his words, "I have tried it all to see what works and what I should throw out… and I ended up finding CrossFit. It fits me. Everett trains Olympic lifting four to five days a week and does sprint workouts or metcon CrossFit workouts three to four days a week. One month out of the year he follows the WOD cycles directly from the CrossFit.com site.

Past sporting endeavors

Marshall has been active in basketball, hard court and beach volleyball, baseball, and a variety of other team sports throughout his life. Swimming, cross-country running, and badminton are some of the individual sports he participated in. He also is an avid skier, mountain biker, and rock and ice climber. At 5'5", Marshall can easily grab a basketball rim at 10'.

Playing soccer at the national level was part of Fitzgerald's past, as was university-level basketball and junior hockey. He also ran cross-country and amateur trail runs, which could have something to do with his impressive results on the run at the Games.

Because he underwent three surgeries in three years while on the football team at Division 3 Ohio Northern University, Everett played only ten games there. But In those ten games he scored nine touchdowns! He was also an All-American sprinter on the 4x100m relay team in 1995. His school record in the 110-meter high hurdles still stands at 14.48—and all this after the three surgeries.

What all this means for everyone else

Fitzgerald was consistent enough across the board to win the overall title by taking second place in the hopper workout and the run. Everett was in the top of the pack in the hopper and strength events, but fell back a bit in the run. Marshall won the hopper event, came in third in the run, and lost his edge in the Total. (The Top CrossFitter award did not take weight classes into account.)
So, all you have to do to be competitive at next year's CrossFit Games (July 5-6, 2008) is bring your "Fran" time to under 3:00, deadlift more than 2.5 times bodyweight, and perform "Linda," in good time, as if you were 50 pounds heavier than you really are.
Start training. You can be assured these guys are.

Dave Castro is the seminar and events coordinator for CrossFit HQ. He lives in San Diego.

Combatives Fitness, Part 1

The Warm-Up (Video Article)

Tony Blauer

Online Video Article

Video Article (15:10)

http://media.crossfit.com/cf-video/CrossFitJournal_BlauerCombativesFitness1.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_BlauerCombativesFitness1.mov

Combatives and self-defense expert Tony Blauer talks about the "realistic, scenario-based self-defense" that he teaches as part of his patented S.P.E.A.R. (spontaneous protection enabling accelerated response) system. One of the main points of his work is that an effective combative/ protective system must be based on human physiology and kinesiology—that is, to be most effective, it should work with, rather than against, the body's natural movement patterns and instinctual responses to attack and fear. He has put this kind of training and mindset together with CrossFit principles to create training regimens that develop true functional combative fitness.

In this video article, he shows how he adapts some of the basic functional movements we're all familiar with (squat, push-up, sit-up, etc.) to the tactical environment to create a "Fight Gone Bad"-type warm-up (or workout) with exercises that are relevant to defensive training.

Next month, in Part 2, Blauer will present and discuss a full scenario-based workout.

Other articles by Tony Blauer in the CrossFit Journal:

"Fight Training Fitness: An Interview with Tony Blauer," by Yael Grauer, issue 54, February 2007

"Combat Calisthenics," issue 47, July 1006

Tony Blauer is CEO of Blauer Tactical Confrontation Management Systems (BTCMS), a consulting firm specializing in research and development of combative programs for the military, law enforcement, and martial arts communities. He is highly sought out by progressive trainers interested in his S.P.E.A.R. System for counter-ambush and extreme close-quarter tactics and for his High Gear simulation equipment for advanced scenario work.

On Being a Trainer

(Video Article)

Greg Glassman

Online Video Article

Video Article (12:21)

http://media.crossfit.com/cf-video/CrossFitJournal_CoachTrainerTalk.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_CoachTrainerTalk.mov

Coach Glassman addresses a group of trainers-in-training on what it means to be a good trainer and why it matters. How successful you are—how good you are—he argues, is entirely up to you. While competency in the mechanics is the sine qua non of training, one of the differences between good and great trainers is passion. Passion for movement, for people, for spreading knowledge. It is not about marketing or a great "business plan," or having the perfect space, or any of the other accoutrements. It's about loving what you do, caring enough to do it right, and, ultimately, sharing your knowledge as broadly as possible.

"Leverage your efforts," he says. "Talk to anyone who will listen to you about what it is that you do. But only if you love it—if you can get up and say Man, I want to show you something really cool. It's the squat. It's unbelievable. It's the simplest, most overlooked thing in the world. If you feel and believe that and can express that with passion, people are going to follow you anywhere. And they'll throw money at your feet."

Related articles by Glassman in the CrossFit Journal:

- *"Fundamentals, Virtuosity, and Mastery," issue 36, August 2005 (.pdf)*
- *"Professional Training," issue 41, January 2006*
- *"Scaling Professional Training," issue 41, January 2006*

Greg Glassman is the founder (with Lauren Glassman) of CrossFit, Inc., and CrossFit Santa Cruz and is the publisher of the *CrossFit Journal*.

The Turkish Get-Up, Part 3

Overhead Squat Variation

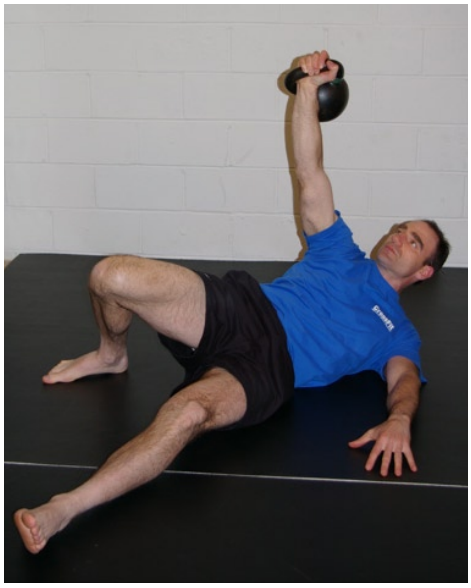
Jeff Martone

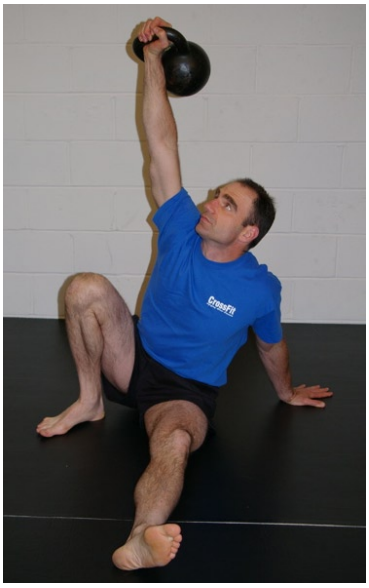
"A wise man is strong; yes, a man of knowledge increases strength."
– Proverbs 24:5

The TGU overhead squat is the final progression in this series on kettlebell get-ups. It is an outstanding exercise that requires and develops balance, strength, stability, and flexibility in the ankles, knees, hips, upper back, and shoulder girdle. This exercise is an advanced progression that may initially prove too challenging for some people. It is commonly very challenging for those who fit the profile of "mature" male athletes with "high mileage," or others with a lifetime of acute and chronic pre-existing injuries resulting in various range-of-motion limitations. If you fall into this category, do not despair. Focus your efforts on what you can do (i.e., maximizing your performance of the tactical TGU and gradually working your overhead squat at light weight). Over the years I've been doing and teaching this move, I've noticed that women often seem to transition to this exercise more naturally than men.

TGU overhead squat

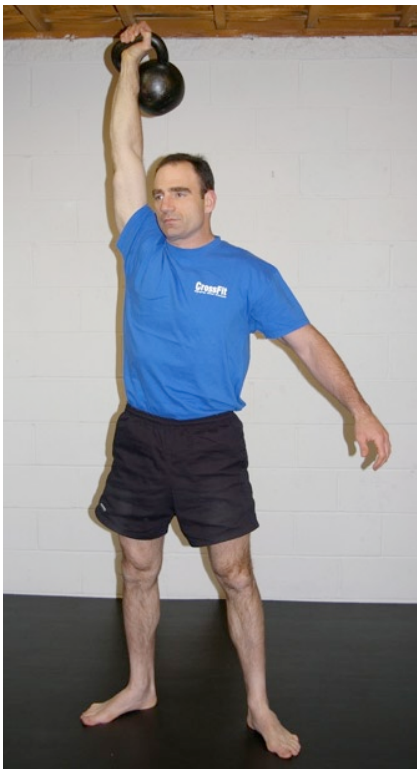
1. Begin exactly as you would to perform the tactical TGU (as described in *CrossFit Journal* #57), from lying on your back—with the kettlebell extended straight above you in your right and your right foot posted on the ground—up to the sitting position. The heel of your posted foot needs to be as close to your buttocks as possible.
2. Transition to the squat position by pressing the shoulder of your posted hand (your left) down and away from your ear. Lift your left hip off the ground and firmly plant your foot—not your knee—on the floor. Your feet should be in a good squat stance, about hip width apart, with toes pointed slightly outward. Keep your eyes on the kettlebell while making this transition.
3. Establish your balance by bringing the elbow of your left hand between your knees, with triceps pressing firmly against your inner thigh.
4. Before you stand up, make sure your weight is on your whole foot, not just the ball or toes. Pressurize your abs by inhaling through your nose and creating pressure in your lower abdomen.
5. Contract your glutes and then stand up. Be sure to press equally off both feet while moving from the squat to standing.





The Turkish Get-Up, Part 3

...continued



Options from the standing position

Once you have made it to standing you have three options for returning to the starting position. These options are also safety measures that help adjust the technical difficulty of the exercise to the athlete. From least to most challenging, they are:

1. Slowly lower the kettlebell to your shoulder then to the floor.
2. While keeping your arm straight and the kettlebell overhead, descend to one knee and then return to the starting position as you would in the tactical TGU.
3. While keeping your arm straight and the kettlebell overhead, squat and carefully reverse the movements of the TGU overhead squat until you are back in the starting position.

Tips:

- Practice the movements without a kettlebell for the first few reps. Then progress to a light kettlebell—i.e., one that is one or two sizes smaller than you would normally use for TGUs.
- Move slowly and precisely.
- Maintain constant tension in your torso, shoulder, and arm throughout the movement, and actively press the kettlebell up toward the ceiling on a straight, fully-extended arm and shoulder. Nothing is loose or casual in this exercise.
- Stay as fresh as possible, never training to muscle failure.
- No pain is gain. If something doesn't feel right, stop and re-evaluate. You may be doing something wrong. Or you may be trying to lift heavier than your strength and flexibility will allow. Or, you may be doing everything right but fit the profile of those who have difficulty with this exercise and it may not be the best one for you at this point in time.

The bottom line: Train smart. Choose a TGU variation that works for your body and that makes it stronger. That's the goal, after all.

◇

Jeff Martone, owner of Tactical Athlete Training Systems, was one of the first certified senior kettlebell instructors in the United States. He is the creator of "hand-2-hand" kettlebell juggling, SHOT training, and the T.A.P.S. pull-up system and is the author of six training DVDs. He has over 15 years of experience as a full-time defensive tactics, firearms, and special-response-team instructor.

Teaching the Jerk, Part 4

Skill Transfer Exercises

Mike Burgener, with Tony Budding

In this article, we'll introduce four skill transfer exercises that develop proficiency in the four main aspects of the jerk. We assume that the basics have been established and that these exercises will be used to refine the movements and introduce the athlete to jerking heavier weight. Once an athlete can jerk proficiently with light loads, we want to develop their capacity at higher and higher loads, regardless of specific goals for Olympic style weightlifting, because it maximizes the stress and adaptation and develops the most proficient movement possible.

The four main aspects of the jerk are 1) executing a powerful vertical dip and drive (or down and up), 2) aggressively driving the body down under the bar with the arms, 3) receiving the barbell overhead in the frontal plane, and 4) stabilizing the load overhead while standing upright. The following four skill transfer exercises develop capacity in each of those areas.

Rack Jumps

You will need a power rack for this exercise. Set a bar on the pins of the power rack at the same depth as the dip used in the jerk. Start by standing with the bar on the back, as for a back squat, and then bend at the hips and knees as in the dip of the jerk, vigorously extend the ankles, knees, and hips to aggressively jump the body upward—but come off the ground no more than half an inch or so. It is important to note that, as with jumping squats, the athlete must hold the bar down on the back of the shoulders while jumping in order to keep the bar from moving upward off the shoulders at the point of full extension. The athlete after extension (jump) is complete decelerates the downward action of the body back to the starting position with the bar on the pins in the rack.

The purpose of rack jumping is to develop strength, power, and confidence for the jerk, specifically the dip-drive portion. Once the movement is proficient, weights significantly greater than your max jerk can be used. Handling these greater weights makes normal jerk loads feel lighter and more manageable. Do about two to three reps for three to five sets.

Online Video

Rack Jumps Video

http://media.crossfit.com/cf-video/CrossFitJournal_RackJumps.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_RackJumps.mov

Tall jerks

Hold the barbell at or just above the forehead. Look up slightly with your head (mimicking having just gotten out of the way of the rising bar), and rise up on up your toes. With no dip whatsoever in the hips, knees, or ankles, aggressively drives your body down with your arms into the split position, receiving the barbell overhead. This drill should be practiced first with PVC before attempting even an empty bar. Once any weight is used, it is essential to resist the desire to initiate the movement with a dip-drive (stretch-shortening cycle) of any kind. Fast, aggressive movement is required for success. From the split position, the lifter should return to a full stand by stepping halfway back with the front leg, then halfway forward with the back leg.

Tall jerks help develop speed and aggression in driving the body under the bar with the arms. Light weights should be used initially, with loads very gradually increased as proficiency is developed. Do about three to five reps for three sets.

Online Video

Tall Jerks Video

http://media.crossfit.com/cf-video/CrossFitJournal_TallJerks.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_TallJerks.mov

Teaching The Jerk, Part 4

...continued

Jerk balance

Using the Murray cross as described in our first jerk article in the June issue, place your feet at the 3 and 9 o'clock positions on the horizontal axis. With the bar in the front rack position (as for a regular jerk), set your back foot at either the 5 or 7 o'clock position (for left splitters or right splitters). Step two to three inches forward with the opposite foot, getting set to dip vertically into a short lunge position. Once set, inhale through your nose and expand your stomach, keeping your chest elevated. Bend at the knees and keep the torso vertical while in this short split position. Drive your body and the bar upward, keeping your back leg on the ground while stepping vigorously to the split foot position with the front leg. Visualize breaking a plane of glass with your head and front leg as they drive up and forward. The barbell will travel vertically, though. From the split position, return to standing by stepping halfway back with the front leg, then halfway forward with the back leg.

Jerk balances train proper foot placement and emphasize the sensation of driving the head forward as the bar clears the head. In a perfect jerk, the back foot lands a moment before the front foot, and the head moves under the vertical path of the bar. Light weights should be used initially, with loads very gradually increased as proficiency is developed. Do about two to three reps for three to five sets.

Online Video

Jerk Balance Video

http://media.crossfit.com/cf-video/CrossFitJournal_JerkBalances.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_JerkBalances.mov

Jerk supports

You'll need a power rack for jerk supports. Set the pins in the power rack about 6 to 12 inches above the head when the body is upright in an extended position. (The pins can be set higher when you're first learning this exercise.) Grip the bar as you would for a jerk, and then squat down until your arms are extended overhead, which is the receiving position for a push jerk (also known as power jerk). With your arms fully extended, stand upright into the finish position for the jerk with the feet in line horizontally. This movement can also be done from the split position, finishing in the upright, full standing position.

I love using this exercise with athletes who have great speed and power but lack overall body strength. This movement teaches them to stabilize the bar overhead in the finished position. You will be capable of handling more weight in the jerk support than you usually can in the jerk. Do about two to three reps for three to five sets.

Online Video

Jerk Supports Video

http://media.crossfit.com/cf-video/CrossFitJournal_JerkSupports.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_JerkSupports.mov

Tony Budding is the Media Guy for CrossFit, Inc., and a trainer at *CrossFit Santa Cruz*.

Mike Burgener is the owner of *Mike's Gym* (a CrossFit affiliate and USAW Regional Training Center), is a USAW Senior International Coach, former junior World team (1996-2004) and senior World team (2005) coach, and strength and conditioning coach at Rancho Buena Vista High School in Vista, Calif.

Wrestling with Dan Henderson

Simple Takedown

Becca Borawski

Despite its place as a key element in Mixed Martial Arts, wrestling is frequently not prioritized by fighters learning the trade. Younger fighters often begin primarily as jiu-jitsu practitioners or kickboxers and later add wrestling in when they decide to transition to MMA. The fighters who come from wrestling backgrounds, however, have proven themselves dominant in the sport throughout its history so far—from Mark Coleman and Matt Lindland to Matt Hughes and Sean Sherk.

This month's article is the second of two featuring Pride welterweight and middleweight champion Dan Henderson. Henderson is known for his vicious overhand right, but prior to his MMA career, he was a highly decorated wrestler. Dan began wrestling at the age of five and went on to become a member of two Olympic teams. Last month I spent a day at Henderson's Team Quest gym in Temecula, California, and he shared a couple of his wrestling techniques.

The wrestling technique Dan is demonstrating here begins with him having an underhook on his opponent, Thierry. This position can be attained either following a wrestling collar tie, which was discussed in last month's article, or if a fighter is blocking strikes in close and digs in for the underhook.

Dan has a deep underhook, which means his right arm is going underneath Thierry's arm, and his right hand reaches over from the back to grab onto Thierry's left deltoid. Thierry's left arm is lying as close as possible to the bend of Dan's right arm, not high up on Dan's shoulder. Dan's left hand is gripped on Thierry's right elbow.

The next step in this takedown is for Dan to change levels. Changing levels means that he drops his focus down to Thierry's legs. He places his left hand on Thierry's knee to block it from moving.

With Thierry's knee blocked, Dan is able to run across the front of his opponent. He runs forward a few steps, keeping his left hand on Thierry's knee and keeping his deep underhook with his right arm. Dan's forward movement will cause the underhook to pull Thierry off balance, and the knee block will prevent Thierry from recovering his base and being able to keep his balance. Dan will further block Thierry's leg by placing his own inside leg (his right) on his own left hand, to inhibit movement either to the side or to the front.

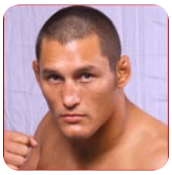
Simple Takedown

...continued

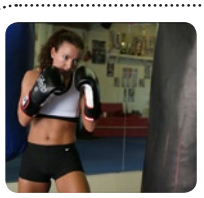
Dan will continue to run forward until Thierry falls and Dan will end up in side control, having already cleared Thierry's legs. This is especially important if your opponent is a jiu-jitsu fighter and his guard is a potentially dangerous place.

Sometimes it will take more than a few steps to get the opponent to the ground. And sometimes the opponent will hop defensively and prevent the takedown. According to Dan, just keep running until he falls, or, if you run out of space, pin him to the side of the ring or cage.

To see takedowns and the upper-body clinch in action, check out any of Dan's fights in the Pride Fighting Championships over the past few years, but in particular his fights against Ricardo Arona and Murilo "Ninja" Rua.



Dan Henderson is a professional MMA fighter who trains out of Team Quest in Temecula, California. He currently holds the Pride welterweight and middleweight titles. He will be fighting for the UFC against Quinton "Rampage" Jackson later this year.



Becca Borawski, CSCS, teaches and trains at *Petranek Fitness/CrossFit Los Angeles* in Santa Monica. She has a master's degree in film from the University of Southern California and a background in martial arts training. She has blended these skills to produce DVDs and build websites for professional fighters. She currently trains Brazilian Jiu-Jitsu with Rey Diogo, a Carlson Gracie affiliate.

Genetic Potential

Lon Kilgore

I have kids. One, a six year old, Thomas, loves all things Martial Arts. Since he was four years old, he's been studying with Harley Elmore, a heavily credentialed and amazing instructor in Jeet Kun Do, Sayoc Kali, Muay Thai, and Silat. Why, as a little four-year-old, did he make a decision to study martial arts? I bet you can guess. TV. I'm not sure but I'll wager that there has been a large upturn in the traffic in any martial arts business with a good kids program due to two cartoons: *The Avatar* and *Naruto*. Both of these shows have engaging stories, interesting characters, and prominently feature fictionalized and/or magical martial arts forms rooted in Chinese and Japanese forms. But this article isn't about martial arts, kids, and cartoons, it's about genetic potential? You'll see the connection soon.

In *Naruto*, the title character, Naruto Uzumaki, lives in a community protected by a revered troop of Ninja warriors. His single-minded purpose in life is to complete Ninja school, become the greatest Ninja of all time, and ultimately become "Hokage," the leader of the Ninjas. To do so he must overcome his orphan status, prove himself in school and in the field, and learn how to deal with an occasionally active supernatural demon spirit that was purposely trapped in his body to save the world (OK, that last bit is weird but it's part of the story). But the lesson I want to address here deals with not Naruto Uzumaki but with a couple supporting characters, Sasuke Uchiha and Rock Lee. Sasuke is the consummate "natural," possessing amazing abilities inherited from his family, and seems to effortlessly and intuitively perform combat skills without instruction or practice. Then there is Rock Lee, a Ninja nerd with absolutely no natural ability but a work ethic the size of Texas and an absolute commitment to never quitting, even if it kills him.

The interesting point here is that the two characters are of the same Ninja rank and level of performance, but the means by which they arrived there were quite different. One, Sasuke, relied on genetic characteristics innate to his family. The other, Rock Lee, is competitive only because his sensei determined that, for him to be able to hang with the other Ninja students, he had to become insanely fit—he had to be able to rely on a tremendous work ethic and superior fitness to carry him further than Sasuke's reliance on natural ability. In the real world, this would be exemplified by the athletic genetic "freak" having his performance matched or beaten by the guy with an average set of genes who just trains smarter, harder, and more diligently (Dominic Rhodes vs. Steve Largent might be an example, in the realm of football).

The term "genetic potential" is usually invoked by people trying to generically describe the difference between winners and losers. A more useful and precise definition of genetic potential is whether an athlete possesses the active genotype to excel in sport; or, in simpler terms, does the athlete have the optimal set of genes and enough of them turned on to be the best in a selected sport. Humans share a great deal of commonality in the genes they possess, but there is variation in both the genes possessed and the genes expressed (turned on). With at least 73 genes associated with fitness and performance, the variations in possession and activation lead to differences in performance potential through a simple biological path: DNA makes RNA, which makes protein, which makes structure, which makes function. If you have more active copies of a performance-related gene than someone else, your performance will most likely be superior to theirs. The bottom line is that genetic potential ultimately has a strong effect on individuals' athletic performance. That's just the reality of it.

To be truly fit to survive, fit to live, fit to work, and fit to play, we need to drive across-the-board adaptations, and we need a system of training that activates every performance gene in its path.

A good example of how possession of a specific gene may affect performance is the *actn*3 gene, a little segment of DNA that ultimately codes for the synthesis of alpha-actinin, a structural protein in muscle fiber. Possession of certain variants of this gene is strongly associated with elite sprint performance. Three variants of this gene have been identified: RR, RX, and XX. In elite sprinters, 50 percent of the *actn*3 variants present were RR, 45 percent were RX, and 5 percent were XX. At the other end of the sport metabolic continuum were the elite endurance athletes. Their profile was markedly different, with only 31 percent RR, 45 percent RX, and 24 percent XX. Given this data, the RR variant has been termed the "sprint" variant and the XX the "endurance" variant, as it seems clear that the possession of those variants in varying ratios affects performance capacity.

Beyond possessing different performance-related genes, humans also have a degree of genetic redundancy. Within each human's genome there are usually multiple copies of a specific gene, a safety measure just in case one gene gets damaged or malfunctions. But even though we have multiple copies of genes, not all of them are active at any given time. Many or most of the copies are inactive or repressed when the body is unstressed. In times of need, some of these genes can be activated through various biological processes and then allow for large-scale production of important end products that then affect function (performance). The more copies activated, the larger the scale of production, and likely the bigger boost in performance.

This concept is integral to the human condition. Humans are built to be active to survive but the modern sedentary lifestyles lead to inactivation of the genes related to survival (the fitness and performance genes). Even though the genes are still there, they are essentially dormant because the body is not doing anything to cause a physiological adaptation requiring their activation. It is our job as trainers, coaches, athletes, or just people, to stress the body appropriately so we can turn on the set of performance genes to drive fitness adaptation. It's pretty simple: we know exercise is

Genetic Potential

...continued

good for us because if we are fit we survive longer than those who do not. This is so because exercise activates genes that promote the ultimate end product of "health," our survival in the face of environmental challenge (whether of viral or social origin).

A pleasant byproduct of being fit to survive is a tendency to "feel" better and be better able to perform a spectrum of tasks (personally, I equate this to a better ability to have fun). We do enter into this endeavor blindly, as it is doubtful that the average trainer or trainee will have access to gene profiling technology, but if we assume a trainee has a number of dormant *actn*3 RR genes, for example, we can use high-intensity, low-volume training to activate those genes. This preferential activation will help power athletes attain their fullest performance potential with metabolic efficiency and without the clutter of unnecessary aerobic adaptation. Or we could do the reverse and do larger volume endurance training to activate dormant *actn*3 XX genes to build a better marathoner.

But specializing in on or the other of these two approaches of tapping into genetic potential would emphasize narrowly specialized performance (and therefore reduced ability outside that specialty) rather than broad physical capacity. What's preferable for most of us is a broad-spectrum adaptation that will make a better and more functional human animal. To be truly fit to survive, fit to live, fit to work, and fit to play, we need to drive across-the-board adaptations, aerobic and anaerobic, metabolic and structural, and we need a system of training that activates every performance gene in its path. Unlike weight training or traditional endurance work alone, CrossFit-style mixed-mode training capitalizes on an athlete's complete set of performance-related genes and produces a comprehensive fitness adaptation. A CrossFit body may represent the functional expression of the human genotype as it is intended by nature.

There are a few little details we need to consider about genetic potential. Someone who is genetically favored will progress faster in any exercise system and will ultimately reach higher levels of performance. However, everyone responds genetically to training in much the same way; it's just the rate of progression and the magnitude of result that vary. Occasionally we find a trainee who possesses an excellent genetic profile and will show enormous training adaptations and improve beyond expectations. When this happens, revel in their success, but be wary. Although an individual with few copies of a gene, such as *actn*3, may not be capable of reaching the same level of power performance as someone with multiple copies of a specific variant, appropriate programming will still produce impressive results. Frequently, individuals with great genetic potential fail to train appropriately, since success comes easily even with poor programs. So, in too many cases, the programs that exceptionally talented elite athletes use do not effectively move them toward their potential. Failure of the coach to understand the basic science of training (e.g., the workings of stress and adaptation), or cockiness on the part of the trainee that leads to ignoring sound training principles can allow a genetically gifted but improperly trained athlete to be beaten by a less gifted athlete who is receiving proper coaching and programming. Programming must be individualized, as you cannot utilize that same rates of progression and expect the same magnitude of improvement in the guy with the average set of genes and the genetically gifted trainee. Because we cannot, by definition, alter an individual's "genetic potential," we must not fail to individualize our coaching and programming as well, especially when pursuing very specific competitive performance.

So we come back to my son Thomas. Most people just look at the two of us and comment on the physical similarities. It's pretty obvious that he has inherited some of my genetic potential—or lack thereof—for sport. After all, DNA makes RNA makes protein makes structure makes function. Since I was an average wrestler, a decent weightlifter, the world's shortest varsity rower, a fairly uncoordinated student of Sayoc Kali, and a hack at golf, Thomas likely has much more in common with Rock Lee than with Sasuke Uchiha and will unfortunately have to bust his butt to achieve his goal of being a black belt, weightlifter, and world-class snowboarder. Luckily, I think he has a pretty good shot at the first two, with the benefits of hard work and the help of phenomenal local coaches Harley Elmore and Mark Rippetoe. Becoming a world-class snowboarder in Texas, though, may require more than either genes or determination can produce. For that, he might need magic on the level of cartoon fiction.

Lon Kilgore, Ph.D., is associate professor of kinesiology at Midwestern State University, where he teaches exercise physiology and anatomy. He has held faculty appointments in exercise science at Warnborough University (UK) and in kinesiology at Kansas State University. A nationally ranked weightlifter from age 13, he has extensive practical experience as an NCAA strength coach and as coach of international-caliber competitive weightlifters. He is a coaching certification instructor for all levels of USA Weightlifting's coaching development system and has been a member or Chair of the USAW Sports Science Committee for nine years. In addition to having published numerous articles in both academic and popular publications, he is coauthor of the books *Starting Strength:A Simple and Practical Guide for Coaching Beginners*, *Practical Programming for Strength Training*, and the forthcoming *Basic Barbell Training*.

The Stretch-Shortening Cycle and Plyometric Training

Tony Leyland

I recently overhead a new CrossFit trainee mention that the kipping pull-up he was being taught was "kind of cheating." This is a very common response that shows that many people are unaware that functional movements often require contributions of eccentric (lengthening), isometric (static), and concentric (shortening) muscle actions and that one very common power movement uses a stretch immediately prior to the muscle shortening. This pattern is called the *stretch-shortening cycle,* as the muscle is lengthened (while actively working) prior to shortening. Rather than cheating, kipping is just one example of an athlete utilizing this natural mechanical response. Cutting from right to left when playing a sport or performing a drop-down counter-movement before jumping are also examples of stretch-shortening cycles.

Maybe I should quickly review some terminology. When a muscle is active but lengthening, the muscle action is called *eccentric* ("away from the center"). This is different from trying to lengthen a muscle while doing a stretch. In the latter case, the muscle is not actively trying to shorten; it is trying to relax. The opposite movement—the work of a muscle actively shortening, or contracting— is called a *concentric* ("toward the center") contraction. When a muscle engages (tries to shorten) but does not change length (or produce motion) it is called an *isometric* contraction.

When you lower yourself slowly into a chair, your hip, knee, and ankle joints flex. Does this mean that your hip flexors, knee flexors (e.g., hamstrings), and ankle flexors (tibialis anterior) are contracting to produce this movement? No, because if you relaxed your leg musculature, the force of gravity would pull you down, and your hips, knees, and ankles would flex without any significant muscular action. In fact, you would descend quite quickly. What in fact happens is that your extensors (gluteals at the hips, quads at the knee, and calf muscles at the ankle) activate to slow you down so you do not plunk down into the seat uncontrolledly. In effect, you just resist gravity a bit but ultimately let it win. The same kind of movement and muscle use also happen in a front, back, or overhead squat with weight. You lower yourself slowly, letting gravity win as you control the descent. Your extensor muscles are the ones working eccentrically on the way down and concentrically on the way up. Numerous muscle groups in the trunk are working statically (isometrically) during these movements to stabilize the spine. So again we see this functional combination (and coordination) of all three types of muscle action.

OK, I know some of you are thinking about Tabata squats. Yes, when doing high-rep air squats at speed you would use flexor muscles to drive the hips, knees, and ankles into flexion. This is because you do not want to wait for gravity to do the job, as it is a bit slow if you want to do 20 or more squats in 20 seconds. But toward the end of the descent you will activate the extensor muscles to slow your descent and then reverse the movement to drive back upwards. So, toward the end of the descent in a fast air-squat sequence, the extensor muscles lengthen (work eccentrically) while the leg joints flex. Therefore there will be an eccentric phase prior to the concentric phase, which is known as a stretch-shortening cycle (SSC). In fact, during Tabata squats you drive yourself upward so fast (extending the ankles, knees, and hips) that your flexors will contract near full extension to help break your upward motion and then "turn you around" fast to begin the downward drive—yet another SSC.

Why do we utilize the stretch-shortening cycle so frequently in human movement? There are several reasons, but the bottom line is that the subsequent concentric contraction is more powerful when preceded by an eccentric phase. It is a well-established fact that muscular forces during maximal eccentric action are greater than during maximal isometric or concentric muscular contractions. So the eccentric phase of the movement is

The Stretch-Shortening Cycle and Plyometric Training

...continued

characterized by high muscular forces. But the external force of gravity or the momentum of a limb, the whole body, or a barbell still overpowers the muscle force (initially), and the muscle must stretch. As the muscle stretches, energy is stored within the muscle and connective tissue. So in the subsequent concentric phase, the muscle force is already high due to the eccentric work, plus there is a return of stored energy from elastic structures within the muscle. Research suggests that this return of stored energy generated during the eccentric movement of the SSC accounts for about 70 to 75 percent of the increase in work capacity in the concentric phase. What this means is that in a properly timed SSC, energy is stored in the elastic structures of the muscle and that energy is returned in the concentric phase. It is OK to think of this as stretching out a rubber band (storing elastic energy) and then letting it go. It is obviously not as simple as that but it does help you visualize the storage of energy.

In addition to the benefit of returned stored energy, the muscle stretch (eccentric action) will initiate a stretch reflex via a reflex arc. A reflex arc is the neural pathway that controls a reflex action. Simply put, stretch receptors (sensory receptor organs located at the tendon-muscle junction) register the stretch and initiate this reflex arc to activate and protect the muscle. Most sensory neurons do not pass directly into the brain, but connect with motor neurons in the spinal cord. So a reflex arc allows reflex actions to occur relatively quickly by activating spinal motor neurons without the delay of routing signals through the brain. This means the muscle force rises faster than it would if starting from a paused position, since neural pathways to the brain are bypassed. Obviously the eccentric action means the muscle is already active prior to the concentric phase of the SSC, which further reduces the time to reach high-force outputs.

Jumping

The fact that muscle can produce higher forces when being stretched is easy to demonstrate. The vast majority of us would have no trouble generating enough eccentric force to control the landing when jumping down from a 46-inch box. On June 22, 2007, in the WOD demo video on CrossFit.com, Brendan showed us that he could jump up to a 46-inch box. But the majority of us couldn't. To jump up requires concentric work and we just can't generate enough force (and hence power) to get back up even with a SSC. Most of us could land into a squat (without rolling) in a jump down from a 5-foot box, but few of us could jump back up. This shows that muscles are stronger during eccentric work.

Online Video

Video

http://media.crossfit.com/cf-video/CrossFitJournal_Aug07_Leyland.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_Aug07_Leyland.mp4

I have included a video that illustrates the benefits of the SSC. This video shows variations of the vertical jump, a common fitness test used to estimate leg power.

In jump #1 in the video, the athlete, Jeff Thornhill from CrossFit Vancouver, executes a vertical jump without any preceding countermovement. Interestingly, this is a common test protocol, intended to remove a skill component and test just leg power. But it is very difficult not to do at least a "mini" countermovement and get some stretch-shortening effect. We are just naturally hard-wired to coordinate such movements in this way. You can see in the slow-motion replay of this jump that despite being asked to jump up from a static position, Jeff does use a small countermovement. If he could tell his body not to do that, his jump would be even lower.

Jump #2 is Jeff performing the jump with a full, natural countermovement. Jeff had chalk on his fingertips so he could leave a mark on the black wall to compare the heights of the different jumps. Not surprisingly, he achieves a greater jump height in the second attempt. I prefer this movement as a test protocol because it is more natural. So it has a bit of a skill component. So what? That skill is part of the athletic ability and potential that the test is supposed to be measuring anyway.

In Jump #3, Jeff has been allowed a two-step approach. Again he jumps higher because, although the extra momentum is generated in the horizontal plane, the extensor muscles have to break this momentum and hence they store additional energy, which can be returned in the concentric phase. This would be a good test protocol for volleyball or basketball athletes. Jeff played a lot of basketball in high school, so he really benefits from the added momentum as he has the skill and experience to coordinate it into an effective SSC. Due to the skill required in timing this kind of jump, it is not a commonly used test protocol.

In Jump #4, Jeff performs the movement with a depth jump off a low plyometric box. This time, he has momentum in the vertical plane that must be stopped and in doing so energy is stored in the muscle during the eccentric phase. The ideal height of the drop depends on the athlete's strength and muscle composition (fast twitch type 2a and 2b versus slow twitch) so there is no one ideal drop height. In a classic experiment, researchers Komi and Bosco (1978) found that the stretch load (drop height) improved jump height when drop heights were between 10 and 24 inches for males and between 8 and 20 inches for females. If you jump from the optimum height for you, this method will often produce your highest vertical jump score. In our video, Jeff does quite well in jump #4, but because he is skilled using the two-step approach and because we didn't experiment to find his optimum drop height for the depth jump, he doesn't beat his third jump.

We must also be aware that experimental data from researchers and field data from coaches do not always concur. Komi and Bosco did not use elite athletes for their study, so the optimal drop height for athletes experienced at depth jumps may be above 24 inches. Many coaches suggest that once an athlete is conditioned to tolerate depth jumps, a drop height equal to the athlete's vertical jump will produce some of the best results.

The Stretch-Shortening Cycle and Plyometric Training

...continued

When I used the analogy of a rubber band earlier, I pointed out that the situation is actually more complex that that. I do not want to get into the details of muscle anatomy but it is very important that you do not consider muscles as having the same elastic properties as elastic bands. Although I have explained that much of the benefit of the SSC is the return of energy stored in the muscle, a lot of this energy is stored in structures called cross bridges that attach to binding sites on protein chains. If you pause after the eccentric phase of the movement, these cross bridges detach from their binding sites and you lose their stored energy. This is why a SSC must be executed with small amplitude, at high velocity, and with no delay. Watch a football running back cut to the side to avoid a tackle. Does he go into a deep knee bend to initiate the evasive move? No; it is a short, sharp flexion-extension movement (an explosive SSC). In the vertical jumps Jeff does not pause at the bottom of the countermovement; the movement is a quick reversal of momentum.

Jump #5 attempts to illustrate the above point. In this case, we asked Jeff to jump from a high plyo box before executing his vertical jump. It seems logical that Jeff would jump his highest in this test, but he doesn't. Although he has no trouble controlling the landing, he has to go into a deeper knee bend to do so. He generates a lot of eccentric work, but the muscle has stretched so much that many cross bridges have had to detach and re-attach as the muscle lengthens. Each time they detach from their binding sites, stored energy is lost. Jeff is very strong and does quite well in this jump—but clearly not better than with the two-step approach. Dropping from even higher boxes would result in increasingly lower jumps. If you watched the June 22 WOD demo, you will notice that Brendan doesn't jump straight back up from the landing. Forty-six inches is simply too high to be a good height to do repeated bounding plyometric jumps. However, he does start each jump with a countermovement to utilize the benefits of a SSC. Obviously, some elite athletes who are specialized in jumping (like elite basketball players) may be able to do so repeated jumps from higher heights but this does not mean those heights are optimal in terms of the rebound vertical jump height.

It makes sense that our muscular system has a large capacity for force production during an eccentric muscle action. This allows us to efficiently control movement and protect less pliable structures of the neuromuscular system from damage from high-impact forces or repeated low-force activity. Every time our foot lands in running and jumping, our muscles work eccentrically to control the landing and stop our downward descent. If we had no strength in the eccentric phase, our muscles would be torn apart from the high-impact forces we experience.

Kipping pull-ups

So back to those kipping pull-ups.

The kipping pull-up uses the momentum from the down phase to stretch the lats, pecs, and numerous other muscles that cross the shoulder, prior to the concentric phase (hence a SSC is initiated). The brachialis and biceps will also undergo a SSC if you allow the elbows to fully extend (as you should). So the kipping pull-up is similar to the situation in jump #3, where the amount of momentum that must be reversed by eccentric forces is beneficial, even if most of it is in a horizontal plane in this case. You push out from the bar and swing down and forward, so that as you move under the bar you are moving horizontally. But you will still initiate a good SSC and then power back and up. The speed of the ascent is greatly increased as the positive concentric work is enhanced. A word of warning: although we showed the benefits of a vertical drop for jumping, do not try a fast straight drop down from the pull-up bar. Because the shoulder is less stable than the hip and protected by smaller muscles (and smaller, less dense ligaments), you shouldn't do a purely vertical fast drop. Strict pull-ups that descend vertically are performed much more slowly than kipping pull-ups.

In plyometric training, athletes perform multiple jumps and other activities that utilize the SSC. Research has shown that the high forces generated by the eccentric phases cause beneficial adaptations. These muscle adaptations include increased rate of force development and hypertrophy of type 2b fast-twitch fibers. In a study using rats, Dooley found that plyometric training increased force output by 15 percent, increased the maximum speed of force development by 3 percent, increased fatigability by 15 percent, and decreased the cross-sectional area of fatigue-resistant fast-twitch fibers (type 2a) by 4 percent.

The increased fatigability and decrease in cross-sectional area of the type 2a fibers seem like a negative effect. But this just shows that the benefits of plyometric training in this study was specific to the explosive fast-twitch fibers (type 2b)—the ones you would use in an Olympic lift or short sprint. Distance running and other endurance activities would focus on slow-twitch fibers and decrease the cross-sectional area of the explosive type 2b fast-twitch fibers compared to fatigue resistance slow-twitch type 1 and fast-twitch 2a fibers. As CrossFitters know, for broad capability it is best to not specialize but to develop all aspects of fitness. Plyometric jumps and medicine ball throws are exercises that will help you develop high power outputs. Just don't overuse them—i.e. don't specialize!

Incorporating plyometrics into your training

If you want to add some plyometric training into your program, the ExRx website shows several plyometric drills. Of course, we can add kipping pull-ups to the few upper-body plyometric exercises on this list.

Anything with a traditional wind-up involves a SSC: for example, swinging a discus back and then hurling it forward, or driving the body ahead of the arm in a baseball pitch (which results in a SSC at the front of the shoulders). A lot of medicine ball work can be done on your own, and if you use an eccentric action to stop

The Stretch-Shortening Cycle and Plyometric Training

...continued

the backward momentum of the backswing and then have an explosive concentric phase, it is plyometric work. The reversals of momentum we see in Olympic style lifts are also plyometric in nature. For example, a clean recreates, in a very controlled manner, the joint loading forces seen during a depth jump. Because you do not have a high-impact landing, the power clean is a wonderful plyometric exercise that can be programmed very precisely and safely.

As with any good type of exercise, plyometric work can be overdone. Many athletes tend to believe that if two aspirins are good for you, eight must be four times better. Plyometrics is not the one magic bullet; don't overdo it. Many athletes have overtrained with depth jumps and injured themselves. The ground contact forces are high with depth jumps, but you can find arguments that they are no more dangerous than running. You can also find arguments that they are very dangerous. Impact force at the feet while running is typically around three times body weight while it can be seven to ten times higher during depth jumps. However, you are landing on two feet, and you are focused on controlling the jump and rebounding, so some studies have shown that the forces on the ankles, knees, and hips are actually not much higher than running. It will obviously depend on the specific exercise and the skill and strength of the athlete.

Whatever the truth is regarding impact forces on the joints, you must always be aware of injury potential in any type of training. Many coaches limit the number of foot-strikes their athletes perform in a training session to reduce the risk of injury. I do not have time for a detailed discussion on plyometrics training sessions but it is worth noting that the intensity of the drill affects the number of contacts you would do of each type. Two-legged hopping, for example, is low-intensity and you can do many repetitions. Two-legged bounding (over a hurdle for example) and single leg hopping are moderate intensity so you would use fewer repetitions. Depth jumps and single-leg jumping and bounding are more advanced plyometric exercises that are beneficial in developing power, but, because they are high intensity and increase the loading on the leg significantly, it is important use very few repetitions. Used appropriately, plyometric training is safe. The American Sports Medicine Association, American Council on Exercise, and the National Strength and Conditioning Association have all supported plyometrics, even for children. Is it any wonder? Kids naturally jump all over the place. Do we really need "experts" to say it's OK?

As ever, the trick is not to overdo a good thing. The doom-and-gloom reports on plyometric-related injuries include athletes who simply did too many jumps, those who added weight to their depth jumps, and those who began plyometric with an insufficient base of strength or fitness. One rule of thumb that is sometimes cited is that, until you can squat your body weight on a bar for five reps with no pauses, you shouldn't start training plyometric jumps. On the other side of the coin, I have heard of athletes doing depth jumps holding dumbbells and/or wearing weight vests. This will obviously increase the impact forces and does carry a higher injury risk. It is also important to be especially careful if you are not jumping on appropriate flooring. Concrete floors are unforgiving and, although we can handle them to an extent, the number of jumps onto such surfaces should be limited. As I have discussed, kipping pull-ups, and some medicine ball throws are plyometric in nature, but they do not have a floor impact phase so they are usually tolerated in higher numbers.

Thanks to Craig Patterson (CrossFit Vancouver owner and coach) for recording and editing the video and to Jeff Thornhill for being our video subject.

Studies and articles cited in this article

American College of Sports Medicine. 2001. "Plyometric Training for Children and Adolescents." Current Comment. December.

Dooley, P.C., J. M. Bach, and A.R. Luff. 1990. "Effects of Vertical Jumping on the Medial Gastrocnemius and Soleus Muscles of Rats." Journal of Applied Physiology 69:2004-2011.

Komi, P.V., and C. Bosco. 1978. "Utilization of Stored Elastic Energy in Leg Extensor Muscles by Men and Women." Medicine and Science in Sports10(4):261-265.

Tony Leyland is Senior Lecturer in the School of Kinesiology at Simon Fraser University, Vancouver, British Columbia. He has taught at the university level for 24 years and has been heavily involved in competitive sports such as soccer, tennis, squash, and rugby as both an athlete and a coach for over 40 years. He is a professional member of the National Strength and Conditioning Association, a Canadian National B-licensed soccer coach, and a level-1 CrossFit trainer. He can be reached at leyland@sfu.ca.

An Explosive Combination

Michael Rutherford

Early last month I launched the third volume in my Dumbbell Moves DVD series. It was a momentous occasion for me, as it pulled together several concepts I had been working on since before I began Volume I. And it was especially rewarding because I had the assistance of one of the first prominent CrossFit athletes—two-time skiing Olympian Eva Twardokens—demonstrating the combination moves for the DVD. What a treat!

The series is dedicated to presenting a concept of conditioning that combines agility training with full-body resistance movements. To my knowledge, this has been unusual in the athletic conditioning world. Since the early 1980s, while I was working with athletes ranging from luge participants to collegiate volleyball players, I have employed both agility work and functional full-body movements, but it wasn't until more recently, with the influence of CrossFit, that I put them together on a regular basis.

Taking my cue from CrossFit, I shredded the conventional rule books and combined what many traditionalists would not combine. I took power movements using barbells and dumbbells (such as Olympic lifts) and traditional agility drills and concocted workouts that combined the two. To many traditionalists, of the ilk I was reared to be, this would not be kosher. The traditionalist would want a fresh nervous system for complex movement combinations and more rest and separation of modes in the daily workout plan.

These "combination" workouts were quite different from the other workouts I had been writing, and they added great conditioning variety for my seasoned athletes and a completely different stimulus. When athletes work together, they can race head to head. When teams work together, I can have them move through in groups, creating an entirely new dynamic and changing up the stimulus and work-rest patterns. If six show up to train, we can work three against three. Three trips through the combination, three minutes rest, for three sets. Great training!

In this month's article I want to present a power combination that you will really enjoy. This workout moves from an overload of dumbbell hang power cleans and front squats to the 5-10-5 drill that is an old standard in football conditioning (where it is also known as the "pro agility" drill).

Taking my cue from CrossFit, I shredded the conventional rule books and combined what many traditionalists would not combine.

The pro agility is the gold standard for many football coaches. It's a benchmark—not unlike CrossFit's "girls"—by which football athletes from across the globe can be compared. A good pro agility

An active athletic stance is the start position for the "pro agility," and it has broad application and crossover to other sport movements.

An Explosive Combination

...continued

score shows excellent change-of-direction and agility skills and is at least as valuable for a player as a good 40-yard dash time.

The execution of my explosive combination goes like this: After completing an assigned number of clean and squat reps with the dumbbells (three hang power cleans followed by three front squats, in the example shown in the video), the athlete moves efficiently to a set of three cones placed in a line with five yards between them. From the center cone the athlete performs a crossover step and sprints to the right cone. He gets low by dropping the hips, touches the top of the cone with the right hand, and then immediately reverses direction as quickly as possible and sprints to the opposite cone ten yards away. Again dropping the hips to lower the center of gravity and maintain an athletic stance, the athlete reaches down to touch the top of the cone with the left hand and then blasts back to the center cone.

From here there are several programming options. If the athlete is working alone, he can immediately go back to the start for a time-based or tasked-based workout, or, if working in a group, the next person can begin. There are lots of ways to mix it up and make useful combinations. Just remember to vary the load, rest, and overall duration to optimize the conditioning stimulus.

Online Video

Explosive Combination Video

http://media.crossfit.com/cf-video/CrossFitJournal_Aug07_Rutherford.wmv

http://media.crossfit.com/cf-video/CrossFitJournal_Aug07_Rutherford.mov

Michael Rutherford (a.k.a. Coach Rut, a.k.a "the Dumbbell Coach") is the owner of CrossFit Kansas City/Boot Camp Fitness. He has over a quarter-century of fitness coaching experience with athletes of all ages. He has also worked in hospital wellness environments and rehabilitation clinics. Rut holds academic degrees in biology, physical education, and exercise physiology and sports biomechanics. He is a USAW-certified Club Coach and is a CrossFit level-3 trainer. You can learn more dumbbell exercises from his three-volume DVD set *Dumbbell Moves*.

the CrossFit JOURNAL

The *CrossFit Journal* is an electronically distributed magazine chronicling a proven method of achieving elite fitness.

Subscription information and back issues are available at the CrossFit Store at http://store.crossfit.com

If you have any questions or comments, send them to feedback@crossfit.com

Your input will be greatly appreciated and every effort will be made to answer e-mails.

Editors
Greg Glassman
Lauren Glassman
Carrie Klumpar

Advisor
Brian Mulvaney

Design/Layout
Otto Lejeune

www.crossfit.com

The Grinder

CrossFit FRAGO #13, "SHORTY"

CFHQ
Santa Cruz, CA
USA

01 Aug 07

OPS 14
FRAGO 13 to OPOrd 01 — OP GRINDER

Ref: A. OPORD 01 01 Jul 06

Task Organization: Annex A

1. SITUATION No change.

2. MISSION
"SHORTY": Complete as many rounds as possible in 20 minutes: 21 deadlifts, 15 overhead squats, and 9 thrusters.

3. EXECUTION
a. Concept of Operations
(1) Intent. Complete the exercises in order, as quickly as possible, in a safe manner. This is a four-person-team, "time-specific" workout. The purpose of this workout is to develop cohesion and combat fitness under fatigue conditions through shared hardship, challenges, and competition.

(2) Scheme of Maneuver. The platoon will be divided into as many teams of four as possible. Each team will require two .50-cal ammo cans for deadlifts, four 6-foot pickets for overhead squats, and one 25-mm ammo can for thrusters. All teams will start at the same time. Each soldier will complete as many rounds of the prescribed exercises as he can in 20 minutes. One soldier from each team begins with the deadlifts; after completing 21 reps, he moves on to the overhead squats, and the next team member begins deadlifts. Ultimately, all team members will be working their way through the rounds at the same time but at their own pace. The soldiers will complete the exercises in order; they must finish the deadlifts before starting the overhead squats and then finish the overhead squats before starting the thrusters. However, they can break up the sets if needed to complete the exercise—for example, the nine thrusters may be completed in three sets of three. Also, solders may take a break at any time during the workout. During these breaks, another team member who is on the same

exercise can "work in" and conduct his reps of the exercise. This will allow for maximum use of equipment and time. Spotting will not be permitted at any time during the workout.

(3) Main Effort. The safety of all personnel, and the development of unit cohesion and combat fitness through shared challenge and hardship.

(4) End State. The safe and successful completion of all exercises.

b. Coordinating Instructions

(1) Team Organization. Squad leaders can organize their soldiers however they wish. It is a leadership decision on how best to deploy each soldier to accomplish the mission.

(2) Scaling. The workout can be conducted in PT gear or full battle gear to include vests with plates, depending on the fitness levels of your soldiers. Also, soldiers can rest at any time during the workout, if required; however, the clock does not stop.

(3) Scoring. One point is given for each round completed; for example, if a soldier completes 10 rounds and 21 deadlifts plus 15 overhead squats but only 6 thrusters, his score would be 10. The scores of each soldier on the team are combined to obtain the team's total score. The team that has the highest combined score comes in first. Also, each individual soldier's score can be ranked in the platoon.

(4) Safety. Ensure that all equipment is checked and serviceable before conducting the workout, and that all soldiers are proficient in the required exercises. Safety is every member's responsibility.

3. SERVICE SUPPORT

a. Equipment Weights.

Ammo Can Nomenclature	Quantity / Size	Type	Weight	Contents
Cart 25mm APFSDS-T	30 rds	PA125	70 lbs	sand
Cart cal .50 4B/1T	100 rds	M2A1	50 lbs	sand
Picket	6 feet	5410-990139-4444	10 lbs	NA

b. Equipment Requirements. Each four-person team will require two .50-cal ammo cans, four 6-foot pickets (taped or zap strapped together, Ref Ann B) and a 25-mm ammo can.

c. Time and Repetition Recording. One stopwatch for all teams and a method of recording each soldier's reps.

4. COMMAND AND SIGNAL

a. Timer/Score Recorder. Only one timekeeper is required for all teams. All four-person teams begin the workout at the same time. It is recommended that at least one participant also start his stopwatch to act as a backup in case the primary timekeeper's stopwatch fails.

b. Instructor/Coach. To ensure proper conduct of the workout, use of correct exercise form, and safety of execution, a designated member of the platoon can fill this billet.

Annexes:

Annex A Workout Diagram (AOO)
Annex B Equipment
Annex C Exercises

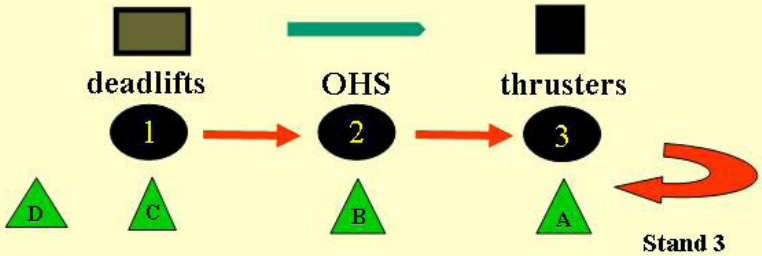
Annex A Workout Diagram (AOO)

Annex A
To FRAGO 13
01Aug 07

"SHORTY": Complete as many rounds as possible in 20 minutes:
21 deadlifts, 15 overhead squats, 9 thrusters

Four-Man Team Layout

Soldier A completes 21 deadlifts. Then he moves on to OHS, and Soldier B begins his deadlifts, and so on. All soldiers rotate through the exercises in order, individually completing as many rounds as they can.



Stand 3 moves to Stand 1

LEGEND

-- 25mm Ammo Can
-- 6 Foot Picket
-- .50Cal Ammo Can
-- Team Rotation
1 -- Exercise Station
-- Soldier

Annex B Equipment

CrossFit FRAGO #13, "SHORTY" ...continued

Annex C Exercises

Thruster

Deadlift

Overhead Squat