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does it," is that a sufficient reason to adopt the same way? I think that would depend greatly upon the performance of the person doing that thing.

It is performance that drives the CrossFit athlete, and it is performance that can be measured and tested. My opinion about kettlebell lifting styles is not necessarily important to your goals. However, rather than just my opinions, what I try to offer here is an analysis that allows you to test and evaluate the two methodologies with respect to your performance and progress.

Matching methods to goals

To understand performance, we must first understand the goals.

An important question to be able to answer before selecting a particular tool or modality is "why?" Why would you select one tool over another, or one approach instead of another?

So, why use kettlebells? This is a relative question because what we are really asking is why we would select a kettlebell instead of something else (dumbbell, barbell, a can of soup, or something else).

The kettlebell is a tool that that is used specifically for the development of work capacity via ballistic repetition. That is its greatest gift. Sure, we can juggle and do tricks with kettlebells, but it is the combination of endurance and strength training that gives them a place among basic strength and conditioning tools.

If your goal is to lift a weight as heavy as possible one time, is the kettlebell the best implement to choose? Most likely not, in that you will be limited by how big the kettlebell can be and by its shape. Sure you can have a 200-pound kettlebell, but it becomes cumbersome beyond a certain size. Traditionally, 48 kg is the heaviest a KB will weigh, unless you move into kettlebells for circus stunts. Anything heavier than 48 kg requires the mold to be larger, and the leverage parameters will change and make the bell unwieldy for all but the most massive frames. A barbell, however, is quite conveniently designed to hold maximum weights, whether 200, 500, or 1,000 pounds. So, for the purpose of lifting a maximal weight one time, a barbell is the logical choice and will allow optimal lifting for that goal.

On the other hand, if the goal is to lift a sub-maximal weight many times, for the purpose of training muscular and systemic endurance, a kettlebell offers unique qualities that will facilitate this goal. The shape and length of the handle and its placement behind the mass of the bell favors high repetition lifting, because the hand can move within the handle and allow a relaxed grip (in a way that dumbbells and cans of soup do not).

A basic classification is useful here. There are three fundamental categories of kettlebell lifting. (They can be divided further, but this is the stripped-down version.)

I. Classical (also called "competitive.). These are the foundational lifts, the basics, the ones that are contested in kettlebell sport meets: clean and jerk and snatch. Simply put, if you're good at these, you're good at kettlebell lifting.

2. Fitness. This category consists of a wide array of movements used to build coordination and general conditioning; includes bodybuilding and feats of strength.

3. Juggling. Just like it sounds, this type involves throwing and catching kettlebells in any imaginable fashion.

Most people first start using kettlebells for basic fitness, in which they do a wide range of activities to learn techniques for working with KBs and start to develop strength and a solid base of conditioning. This is like gym class for kettlebells. Then the question usually becomes, what's next? What happens once you have a basic fitness level?

At this point, a lifter will typically use that basic training either to move into another activity, such as Olympic lifting, powerlifting, or another sport (or CrossFit), or to progress into serious kettlebell lifting.

This is when the study of the classical lifts becomes more important and the finer points of learning are needed most. It is in the precise study of the basic lifts that high achievement can be developed through repetition.

The emergence of kettlebell lifting as a viable fitness method

With the growth and popularity of kettlebell lifting as a mode of effective exercise, it is time to get a clear view of what has transpired over the past seven years, when kettlebells have been marketed to the American public.

In the early days, virtually all the educational information about kettlebell lifting was coming from one source. This information was—and still is—presented as the "Hard Style" or RKC ("Russian Kettlebell Challenge") school. It is a school of thought as well as a school of technique. With the techniques comes also a particular approach to the lifting that suits the types of goals that a student will realistically set and meet.

I will refer this particular approach to kettlebell lifting hereafter as the rigid style (RS).

In contrast to the RS approach is a less promoted, yet more traditional manner of lifting kettlebells. It is not new; rather, it is a long-established approach that emphasizes kettlebell as a primary tool for strength-endurance and repetition ballistic lifting. This traditional style has most closely been associated with Girevoy Sport, which consists of lifting competitions contesting the jerk, the snatch, and the clean and jerk. Maximum repetitions are

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contested within a 10-minute period. It is a sport that deals with work capacity in terms of reps per minute. The results are easily quantifiable by the numbers performed.

The Girevoy Sport athletes have studied the most efficient manner of lifting kettlebells. Their particular approach to kettlebell lifting will hereafter be referred to as the fluid style (FS).

After almost four years of sustained exposure to kettlebell lifting, practiced in the rigid style, I became interested in the high-performance aspect of the lifts, which requires more refined development of the basics. You can get only so far on conditioning and grit; at some point, the finer points of the lifts must be addressed if you want to make continued progress and performance improvements.

For me it took a trip all the way to Moscow, Russia, before I could differentiate between the rigid and fluid styles of kettlebell lifting. It was at the 2005 World Championship Classics there that I witnessed the tremendous work capacity of the lifters and it was clear that their technique was very different from what I had learned and been exposed to initially in my RS training in the U.S.

Since then, spurred on by the emergence of Valery Fedorenko, a world champion in kettlebell sport who lives and teaches kettlebell lifting in the U.S., more information has become available about the most efficient methods for achieving optimal performance from kettlebell training.

Below is a comparison of the way the most basic technique, the swing, is taught in RS and FS methods. I focus on the swing here as an example, but these differences between the two styles can be found throughout the teaching and execution of all the basic lifts.

Rigid vs. fluid styles: Mechanics

Rigid style:

- Hip action: choppy; forced overextension
- Head/eye position: locked into horizontal; restricts hamstring function
- Breathing: opposes movement; exhale coincides with trunk extension
- Grip: maximal tension
- · Arm: locked out horizontally; the arm supports the entire load

Fluid style:

- Hip action: natural extension; neutral alignment
- Head/eye position: follows movement; allows full activation of hamstrings
- · Breathing: coordinates with movement; inhale coincides with trunk extension
- Grip: only as much tension as is needed to hold on
- Arm: relaxed and slightly bent; load supported vertically by base (feet)

The rigid style promotes a short, choppy, snappy motion; the forced extension promotes a hyper-lordosis (excessively arched) quality to the movement of the lower back. The position of the head (always facing straight forward, regardless of the position of the back) causes tension in the back of the neck and down into the trunk extensors and hamstrings; these tensed extensors inhibit elasticity and reduce loading potential. The inhale occurs at the



RS head position



FS head position



RS grip



RS grip

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point of greatest load; this becomes problematic with heavier loads with regards to stabilizing the spine. Squeezing the handle tightly with the palm promotes crushing grip strength, but it diminishes grip endurance. The locked-out elbow requires control of the load by the arm at full extension.

In the fluid style, the trunk goes through a greater range of motion, yet not all the way to overextension of the hip. Neutral alignment is achieved and the head-trunk angle stays constant throughout the range of motion. Breathing matches the trunk movement, and exhaling at the point of greatest spinal load offers greater protection. The grip is firm yet loose, so that output can be sustained. The arm remains loose and slightly bent so that the load stays close to the body and closer to the base.

One manner of lifting is clearly more economical than the other. The rigid style is useful for caloric expenditure, but its mechanics don't allow for prolonged work periods. The fluid style adopts the mechanics that allow for greatest sustained output, which is the whole purpose of kettlebell lifting in the context of performance. This brings the focus of kettlebell lifting back to the basics.

Key differences in approach

The fluid lifter works primarily to time, not to reps. There is a natural cadence that is right for each person, and that varies according to conditioning and control of the body.

In the fluid style, the muscles of the girevik (kettlebell lifter) have to be able to recover ATP stores while holding the KB. This means that he or she is working while resting. This quality of resting under load is a demand unique to kettlebell lifting among the competitive lifting sports.

In many other forms of athletics as well, there is a prominent need for relaxation under load. A prime example is in the fighting sports, which require the ability to relax and recover while subject to external stressors. The relaxed, natural manner of FS lifting is consistent with athletic movements. The signature of a trained athlete is fluidity and grace, an effortless quality of motion.

The RS approach, in contrast, generally focuses on reps, not on time. Typically the goal is reps done as fast as possible. While this is a demanding task and quite admirable, there is a limiting factor because once you approach your anaerobic threshold; you will not be able to continue.

The difference in the quantity of work that can be accomplished in each style, RS vs. FS, becomes very obvious when the sets are extended over a full ten minutes, which is the duration of time given to complete your reps in a competition.

A rigid-style practitioner may be able to do 25 rpm but will be able to sustain that effort for only a few minutes, because of the fast pace and the amount of tension held in the muscles. He or she will tire and lose power very quickly. For example, a well-conditioned RS athlete may be able to last at that pace for as long as four or five minutes. When the set is over, he or she may have 125 total reps.

On the other hand, a fluid-style athlete who maintains patience and a controlled pace may move slightly slower, so that he or she has a chance to breathe and rest after each rep. This athlete moving at the more moderate pace of 20 rpm will likely be able to sustain the effort for twice as long. At this slower pace he or she will have completed 200 reps with the same load. This is the way of pacing, and as it extends out, the pacing will allow much greater volume per set and overall.







FS grip



RS arm position



FS arm position

It is the story of the tortoise and the hare. Everyone wants to be the dashing and fast and confident hare. Yet the tortoise is patient and constant and very calm; confident, too, but in a steady sort of way.

Sports fans in the U.S. often settle performance-based arguments with "Scoreboard, baby!" In competition, the numbers tell the story that ultimately really matters. We can look at the scoreboard and know which team played "better."

In kettlebell lifting, the tortoise wins every time.

Developing capacity

In the broader scope of strength and conditioning training with kettlebells, we regularly mix the dosages and durations of the sets. We may wish to go very, very fast for a shorter period of time, to train power, or more slowly for a more extended period, to train muscular stamina and cardio-respiratory endurance.

The interesting nature of kettlebell training is that you can go from slow to fast (i.e. pick up the pace later in the effort), but you cannot go from fast to slow. You have to learn how to go slow first. This is very important, because, going very fast out of the gate will deplete your energy stores quickly, and once this happens, your set is over. On the other hand, by pacing yourself you can sustain your output over an extended period of time. As your conditioning improves, you will be able to increase the rpms for the period of time that you are working, but you are already accustomed to working, at some level, for the duration. Even if you are training for longer-duration sets using a fluid style, it is certainly possible to move at a much faster pace for shorter sets, when you want to optimize power output. There is a definite place for that approach in the context of circuit and general fitness training. If you can work for six minutes at 20 rpm, for example, you will also be able to work for one or two minutes at 26 to 28 rpm. But if you only practice working at a fast pace for short durations, it will be very difficult to make the leap to longer-duration sets. There is a very specific quality of endurance and stamina that can be developed only by doing longer sets.

The kind of lifting I'm talking about is not taking a heavy kettlebell and doing something one or two or five times. That is exercise, yes, but it does not lead into anything beyond that. This is why it would be referred to as a feat of strength. It shows that you can do some things, but it doesn't say anything about how good you really are with kettlebells. As kettlebells are primarily a strengthendurance tool, and not for maximal strength development, it is appropriate to start slow and build the volume through pacing rather than through maximal effort in each rep. Those feats of strength can be done with anything—a barbell, a sand bag, even a person. Learning how to go slow and relax between reps is the key to excellence. To the casual observer, an elite kettlebell lifter will appear to move very quickly and very powerfully. It will look as if there is no resting at all because of the pace that is maintained. For example, the world record for jerks in the men's competition is 175 jerks with two 32kg bells. This was accomplished in a period of 10 minutes. We know that this is over 17.5



RS hip overextension

rpm, or one rep every 3.42 seconds for ten minutes straight! The numbers are astounding. That is a gross measure of 11,200 kg (24,640 pounds) of overhead lifting in one set.

That example uses the best lifter in the world, so it doesn't relate to you or me personally except as a point of reference. Yet, this lifter, Ivan Denisov, like all the best lifters, actually relaxes between reps. So it is a period of intense explosion, followed by a complete relaxation. In effect, each rep is the same as the previous. The athlete stops because the clock stops. He doesn't rest for long, but you can see that he is recharged before he does his next rep. That is the only way to accomplish such workloads.

The same level of control is possible at whatever your current level. By approaching your kettlebell training with a FS approach, focusing on relaxing as much as possible and training to time and not just reps, you can build a wide and solid endurance base and improve your performance of the basics. Don't be in a hurry to rush through your sets. Spend some time working on holding on to the bell and breathing through the movements.

There are two sides to work capacity. Developing the ability to generate force is an aspect of training that we are all aware of; learning how to control and sustain that force via pacing is an equally important aspect of becoming a skilled athlete, but one that typically garners less attention. This is what the relaxation properties of FS kettlebell lifting teach. Let's start paying closer attention.

Online Video Kettlebell Comparison Video http://media.crossfit.com/cf-video/CotterKBvidJuly.wmv http://media.crossfit.com/cf-video/CotterKBvidJuly.mov

Steve Cotter is a renowned kettlebell instructor who teaches his unique blend of Full Kontact kettlebell training < throughout North America, Asia, and Europe.

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From Rowing Indoors to Rowing on the Water

Judy Geer



Up here in northern Vermont the weather is finally getting warmer. The ice left the lakes at the end of April, and the water temperature is now into the 60s and climbing. If you're a rower, this means you are no doubt starting to feel the irresistible urge to get back on the water. Indoor rowing is terrific exercise, but it will never be quite the same as skimming across the surface of the water in a narrow streamlined racing shell entirely under your own power, feeling the boat surge forward with every stroke you take.

But what is so great about rowing on the water? In reality, indoor rowing offers a number of key advantages even for the hardcore on-water competitor. For an athlete using rowing as a tool to achieve superb fitness, is there really any reason to get on the water? In this article we'll explore that question by addressing the similarities and differences between these two variations of the same sport, and the different benefits they have to offer. Then you can decide whether to take the plunge and see if real rowing floats your boat, as it were.

Let's start with the similarities. The overall body coordination is the same. Whether on the water or off, you catch, drive, finish, and recover in essentially the same way. The stroke is continuous, smooth, and rhythmic. In both cases, you go "faster" by applying more power during the drive, whether it is a boat or flywheel you're accelerating. The faster you go, the more resistance you feel, in the form of the fluid resistance of air against the flywheel or of water against the hull of the boat. And both rowing vehicles allow you to do a vast array of workouts from intervals to 2K races to marathons (though on the water there may be limits to how far you can go without stopping to turn around).

What are the differences? The big one is, of course, the water. When rowing in a boat, there is the possibility of getting wet—and not just from sweating. Water and a natural environment also introduce an element of variability and unpredictability to the rowing experience. Wind, wakes, and waves all add challenge to your workout. Rowing into a stiff headwind definitely makes a workout harder. The challenge of balance is an important difference between on and off-water rowing. In a boat, you control your balance by raising or lowering your oars, which also serve as your "outriggers," keeping you from tipping over. In a slender racing boat, it's very easy for a beginner to flip and end up in the water. Luckily, there are more stable boats for training newbies, which offer the best way to get comfortable with the whole concept of balance on the water. Ultimately, a skilled sculler will be able to balance effortlessly while working at maximum output without ever letting the oars touch the water.

There are some significant differences between using the handle on an indoor rower and using a pair of sculling oars. In sculling, you hold one oar in each hand with your thumb at the end of the oar grip. (For sweep rowing with multiple people in a boat, each rower holds one larger oar with both hands, alternating sides down the boat.) As you progress through the stroke, the oars swing an arc as they pivot against the oarlock. This means that your hands start farther apart at the catch, then swing in and overlap each other in the middle of the drive, and finally swing apart again to the finish. This is slightly different from the straight pull of indoor rowing, and introduces a slightly wider range of shoulder motion.

One of the biggest additional challenges of on-water rowing is mastering the handling of the blade. During the drive, the blade is just under the surface and "square" to the water, close to vertical. During the recovery, the blade is just above the water and "feathered"—rotated to horizontal—in order to decrease wind resistance and make it easier to keep it clear of the water. All of this blade-handling is managed by the fingers with a little help from the wrists. It's a subtle but critical set of moves that must be done in time with the body coordination without adding tension to the arms or shoulders.

There are clearly a number of complexities introduced by rowing on the water that make it a different kind of training session compared to working on an erg. To be sure, you should not expect to get a good workout the first time you row in a boat. In fact, it

From Rowing Indoors to Rowing on the Water

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will probably be several sessions before you can really pull as hard as you'd like to. Ideally, you should start in a stable boat, one that is very hard to flip even if you do things wrong, and then progress to a sleeker shell when you are ready. The most important advice I can offer to a fit athlete learning to row on the water is this: Don't try to pull hard too soon, and take time to figure out the proper blade handling.

So why go to the trouble of rowing on the water? The exhilaration, the powerful grace, and the silent speed are well worth the investment. Once you have rowed on the water, you will have a deeper understanding, even when indoors, of the dynamics of the stroke and the application of power, because you will be able to think in terms of moving a boat and how your body's motions affects the speed of the boat. And if you ever get bored indoors, you'll be able to close your eyes and visualize the real thing.

But even for those whose goal is to be fast on the water, there are certain aspects of indoor rowing that can't be beat. It's a great teaching tool. On the water, your coach can't stand next to you and give hands-on coaching about body position and technique. It's consistent and quantifiable. On the water, it's difficult to monitor improvements in speed since conditions vary so much, but the indoor rower gives you accurate data any time you want it. And finally, it's weatherproof, dry, and convenient. It's always there to give you a great workout even when the weather is lousy or the lake is frozen. You don't have to dress for the wet or the weather, you don't have to live near water, you don't have to launch and then stow a boat, an erg is considerably less expensive to own than a scull, there are no rowing club or boathouse fees, the learning curve is not very steep, and mistakes aren't punished by a dunking.

The bottom line: you can't beat indoor rowing for a convenient and highly effective workout. But you can add to its value—and maybe find a new sport and community you enjoy—by getting yourself out on the water. Give it a try!

How to get on the water

Learn the body coordination first on the indoor rower, and then take your skills to the water under experienced supervision. Don't expect to get a good workout the first time on the water. Take the time to master blade handling and get comfortable before chasing intensity.

Find a sculling camp to attend, or a local boathouse that offers lessons. The following websites will help you locate clubs, programs, and camps:

- o www.usrowing.org
- o www.row2k.com

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- o www.craftsbury.com
- o www.rowinglinks.com
 - www.concept2.com

Judy Geer was a member of three U.S. Olympic Rowing Teams (1976, 1980, 1984). She placed sixth in both 1976 and 1984; 1980 was the boycott year.) Since then, she and her husband Dick Dreissigacker (also an Olympic rower, and co-founder of Concept2 Rowing) have raised three children, now ages 15, 18, and 20, who are national-level competitive athletes in their own right. Judy continues to train and race in sculling, running, Nordic skiing, and biathlon.





My First CrossFit Certification Seminar

Paul Eich 🗸

When I started CrossFit, I was deployed and had been on what I thought was a good rhythm for working out. I had a regular schedule that varied between a focus on runs, a focus on pushups, and a focus on setting a bench press personal record (PR). In October, six months into my time in Baghdad, I was getting nowhere with any of my goals and, not surprisingly, my shoulders were chronically sore. I was primed for a better option. Enter CrossFit.

I did my first WODs in mid-January 2007, and the results since then have been remarkable. I'm significantly more fit than when I started CrossFit, and, just as important, I anticipate making significant additional fitness gains going forward. My shoulder pain is a fading memory. The muscular appearance I wear today is what I would like to have gotten from bodybuilding workouts in the past. I've regained the strength in pull-ups I had 18 years ago, and I've gained a feel for the kipping pull-up. I've learned how to deadlift, and love it. I've gained 10 push-ups and 10 sit-ups, and for the first time I "maxed out" both exercises on a Navy fitness test. While running perhaps a third of the miles that I used to run (very significant as I have grade 3 and 4 degeneration in all three compartments of my left knee), I cut 40 seconds on my 1.5-mile run for the Navy fitness test. Before CrossFit, I was aware of a couple of narrow weaknesses, and was making no progress on training to address them. Since CrossFit, I'm aware of a bevy of weaknesses—and I'm making progress on most of them. The improvement in attitude and satisfaction as I pursue a quantum leap in fitness is remarkable. It is also infectious, and, much to my delight, my wife and children are enjoying CrossFitting as well.

That brings me to the Certification I attended in June 2007 in Vancouver, BC. When I first considered attending a cert, I wondered things like:

- What should I expect to learn?
- Is this just for folks who want to train others?
- Can old guys (athletically speaking), who are mediocre athletes, attend?
- Is there a test at the end?

I found no answers to my questions (although detailed information is now available at http://www.crossfit.com/cfinfo/certs.shtml and at http://www.crossfit.com/cf-info/faq. html under section 8), but decided I would attend regardless. What I experienced at the certification was well-organized, well-presented, and very effective training.

The training was in three parts: presentation, learning and practicing movements, and a daily workout. Day I was dominated

by hearing from Coach Glassman about the conceptual underpinnings of CrossFit training. His presentations made it clear that CrossFit came about by finding out what works empirically and using that information to develop conceptual models, definitions, and methodology that encompass those findings.

However, given CrossFit's open-source, performance-based approach, the concepts are also significant from the perspective that advancing a field of knowledge requires a theory (I attribute my understanding of this idea to Peter Senge's *The Fifth Discipline*). A theory can be tested, evaluated, and then become the basis of further learning (whereas untested and untestable theories abound in the fitness/martial arts worlds and are not generally useful). With a testable theory to explain CrossFit's results, a practitioner can go beyond "monkey see, monkey do" and better evaluate the observed results.

Should you go to a certification? My answer is, if you want to learn to move your body better—much better—and especially if you are not located near a CrossFit affiliate, yes! You should also go if you want to be able to train others to do CrossFit. You should go to a certification if you want to be around a bunch of people who are as comfortable with pain as you are. And you should go to a certification to meet the really interesting people who have given birth to CrossFit.

The people who run the certifications are a remarkable group. Many of them are some of the powerful athletes on display for us in the videos, demos, and photos on CrossFit.com. But Coach Glassman has obviously selected his team with great care, and for more than their athletic prowess, because the group was just as remarkable for their sincerity and professional approach to training. The staff was very gracious while also being confident, competent, and demanding (without being demeaning). It's a powerful combination.

Aside from the staff, I met many people during the cert (I knew not a soul when I arrived on Friday night), and they were all good company. It seemed there was an almost even number of guys and gals, and most were aged 25 to 40, but there were a few even more seasoned than I was. I'd go back next weekend to do a WOD and hang out with them if I could; it was a weekend memorable for meeting a bevy of really grand people. As fellow CrossFitter Barry Cooper said to me when I was preparing for the cert: "Sure, it won't hurt to be in great shape for the cert, but it is guaranteed some II0-pound female is going to crush you. Because of that, CrossFitters are characteristically humble." Well, Barry, some did, and they were!

My First CrossFit Certification Seminar

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So you must be thinking, "Enough of the pleasantries, did the cert make a difference in your training?"Yes, it did, in many ways. First, even though I've been lifting weights and squatting since 1980, and even though I had worked up to doing 400 air squats in 15 minutes before I started CrossFitting, I found out how little I knew about that fundamental body movement. I found out that even after reading Mark Rippetoe's articles carefully four times on my own, I was still missing big experiential chunks of how to tell what a deadlift should feel like. I can complete a front squat now, correctly, and without pain in my forearms/ wrists. I found out how to do a dumbbell thruster correctly (so much easier than I was making it!). I can "feel it' when I do the Burgener Warm-Up correctly. I am no longer intimidated by squat cleans and have some clue about how to do them right. (The clean is a movement I detested but now am eager to learn, which brings to mind Coach's quote from the cert: "It's amazing how useless an activity can seem to be when you suck at it." It also leaves me eager to attend one of CrossFit's Olympic lifting certification seminars.) When people ask, I can say, "CrossFit is constantly varied, functional movements, performed under load at relatively high intensity and over relatively long distances". Most importantly, I can better feel when I'm using my bodyespecially my hips, my spine, and their coordination-correctly.

This has opened up a world of opportunity for learning and highlights how fundamentally applicable CrossFit is. Athletes of all ages, sizes, athletic abilities, and fitness levels need to master essentially the same movements. Knowing how to deadlift, one can efficiently lift objects from the ground the rest of one's days. Developing a fundamentally sound squat is a gateway to a lifetime of mobility. I predict that if you don't see it already, a cert (or perhaps the equivalent 16 hours of personal training with an expert CrossFit trainer) will give you an intuitive understanding of what functional movement means, and that understanding will help you sort out the exercise wheat from the exercise chaff.

The only downside of attending the cert is that I now know how poorly I had been coaching my training partner from Baghdad, the stalwart Captain David Pollock. Sorry Dave. I am glad you thrived in spite of my shortcomings.

I believe my new understanding of better movement will drive better performance, but I won't know until my next bouts with the benchmark "girls"; they are my measuring stick. The only one I've tried since the certification delivered a marginally positive result, with a nine-second improvement on "Fran." What is significant, though, is that I was able to complete much improved—legitimate—pull-ups, which meet what I now realize is the CrossFit standard. So, that's (some of) what you can expect to learn. As for the answers to the other questions I had: "No, it's not just for those who want to train others." "Yes, old and/or mediocre athletes can attend." "No, there's no (written) test." So, yes, go to a certification, enjoy the CrossFit community through a greater depth of engagement, and learn to use your body better. As with the WOD, what are you waiting for? *1*, *2*, *3*, *GO*!



Paul Eich, a.k.a. "Apolloswabbie," is relatively new to CrossFit but brought with him the baggage of over 30 years of uncoached weightlifting, cycling, and running. He was awarded instructor rank in Shotokan karate in 1997. A Naval Aviator with 18 years on active duty, his three most recent deployments were to the Central Command Area of Responsibility and included a tour launching combat missions from the deck of the USS *Enterprise*, flying combat missions in support of Operation Enduring Freedom, and serving with the U.S. Army on the Multi-National Corps - Iraq.

Greco-Roman Takedown

Wrestling with Dan Henderson

Becca Borawski

For this month's article I traveled to Temecula, California, to spend a day with Dan Henderson and his fighters at Team Quest. Dan recently achieved the historic feat of earning both the welterweight and middleweight Pride titles. Although over the course of his Mixed Martial Arts (MMA) career he has evolved into a well rounded fighter, wrestling was Dan's original sport. A member of two Olympic teams, Dan is an accomplished and decorated Greco-Roman wrestler. This month's technique will be the first of two wrestling takedowns Dan will demonstrate for us.

This move begins with Dan getting his right arm in an underhook on his opponent, Thierry. This means Dan's right arm goes underneath his opponent's and his hand comes back up and over the shoulder. Dan has a firm grip on Thierry's deltoid with his right hand. Thierry's arm is lying in the bend of Dan's arm, not up on Dan's shoulder. With his left hand, Dan has a collar tie—with his left hand on the back of Thierry's neck and his elbow in Thierry's chest.



Next Dan adjusts his opponent's head placement. He makes sure his own head is on the side of his collar tie, and Thierry's is on the side of his underhook, between Dan's head and Thierry's own arm, tight to Dan's chest.

Dan locks his hands together behind Thierry's neck. His right hand, the underhook side, will be palm down. His left arm, the collar tie side, will be palm up. His elbow will remain in Thierry's chest.



Greco-Roman Takedown

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To see takedowns and the upper-body clinch in action, check out any of Dan's fights with the Pride Fighting Championships over the

last 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.

Mark Rippetoe

I have been accused of being an asshole on more than one occasion. This is probably due to the fact that I am an asshole, and compounded by the additional fact that I speak my mind rather too easily. I tell you this to provide context for the following remarks, some of which may cause less cynical people to take exception. But here we go.

There is a lot of advice, information, and well understood knowledge regarding the field in which I practice—strength training and fitness—that is just silly bullshit. Plain old "SB" (to keep from baiting the censors too temptingly). And it comes from numerous sources: chief among them are medical professionals who think that they are also exercise professionals, muscle magazines published specifically for the purpose of perpetuating it, home exercise and weight loss advertisers, Internet fitness sites, the academic exercise people, and the mainstream media, who are the mindless pawns of the others.

Doctors et al.

Let's start with medical professionals who practice more than merely medicine. Doctors who treat exercise as a subset of orthopedics or cardiology are more common than those who regard it as a separate discipline that merits *actual study*. These folks are sufficiently arrogant about the vast scope of their knowledge that they probably will offer to fix your television if you mention that it broke while you're at their office for your tendinitis.

Here's an example of exercise advice from a doctor who doesn't understand a few key points. From the website of Gabe Mirkin, M.D., we receive the following wisdom: "Exercise does not make you stronger. If it did, marathon runners would have the largest muscles of all athletes." (This reflects the common conception in the medical community that long slow distance equals exercise.) "The single stimulus to make muscles larger and stronger is to stretch them while they contract." (Since this is obviously impossible, I assume he means an eccentric phase.) "When you try to lift a heavy weight, your muscles stretch before the weight starts to move." (Yep, he means eccentric.) "The greater the stretch, the greater the damage to the muscle fibers and when they heal after a few days, the greater the gain in strength. The results for this study give a clear message. You become stronger by lifting heavier weights, not by exercising more."

Fascinating. His last sentence is correct, but if I am correctly interpreting his poorly informed comments—and I believe I am—he apparently thinks that no one gets stronger without an eccentric phase included in their chosen exercise. Power snatches, power cleans, and throwing heavy things cannot make you strong. Yet look at this from another article on strength for cycling: "Competitive cyclists gain tremendous leg muscle strength just by climbing steep hills very fast, which exerts as much force on their leg muscles as weightlifting and makes them very strong."

The man doesn't understand that riding a bike completely lacks an eccentric component, but he claims that you can still get strong by climbing hills. And here is a repeated theme: "All athletic training is done by stressing your muscles with a hard workout, taking easy workouts until the soreness disappears, and then taking another hard workout." The notion that training while sore is detrimental appears in many articles on his website, and reflects a lack of understanding of how advanced athletes train and adapt to their training.

This is typical of the level of understanding that physicians bring to the weight room. The recommendation to wait until soreness is gone to train again indicates a complete lack of practical experience with weight training, experience that would teach the necessity of training while sore for virtually every athlete who wants to improve. And the failure to understand the difference between eccentric and concentric types of contractions is understandable in a lay person, but not for a *doctor with a fitness website*.

And isn't it fascinating that your pediatrician will always advise you to prevent your child from lifting weights, an activity that in any incarnation is far safer than most other things kids can do, but will never, ever advise against soccer—the most dangerous sport in the world. (Go ahead, Dr. Sultemeier, look it up. I dare you.)

> It is incumbent on you, yesYou, to educate yourself to a sufficient extent that you are in a position to evaluate information issued from a position of authority. You are supposed to be able to recognize silly bullshit when you hear it.

We have doctors to thank for lots of SB. The advice to always ask a doctor before you (yes, you) start any exercise program is rather self-serving, considering the fact that they are the ones billing for the office visit, and the silliness of insisting that a healthy 35-year-old get a checkup before he starts to lift weights makes one suspicious of the actual purpose. As mentioned earlier, the medical community is famous for equating exercise

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with running, walking, cycling, and other such monostructural aerobic-pathway activities that are measured by the time spent engaging in them. The pamphlet rack in the waiting room is typically stuffed completely full of references to "20 minutes of exercise a day, 5 days a week," as if the only way to quantify a stress that leads to an adaptation is with your Polar RS 800 fancy watch/heart rate monitor.

Tommy Suggs, my old lifting friend, once said, "If I had to choose between looking like a marathon runner or having a heart attack, I'd take the heart attack." How running 26.2 miles at one time ever got to be associated with a Good Thing just beats the absolute hell out of me. Yet it is held up to everybody as the sine qua non of physical accomplishment. Why, the very term "sports medicine" actually means "treatment of runninginduced overuse injuries." Long slow distance training-or LSD, as it has come to be called—is not only a poor way to lose bodyfat and gain cardiovascular fitness; it may be the single best way (especially when combined with the FDA's dietary recommendations) to lose muscle mass ever devised, and it has never made anyone stronger (as even Dr. Mirkin knows). Yet the vast majority of exercise advice from the medical community involves LSD of one type or another: the old traditional workhorse of the LSD world, jogging, its even more ineffective little brother, walking, or their still less effective but more fun and better-looking cousin, cycling. All these activities can be measured in minutes, which makes them easy to prescribe but also renders the prescription virtually meaningless, as it completely ignores the intensity at which the exercise is done. The "S" is usually overemphasized by people doing LSD.

This little tidbit is one of the problems with most advice from medical types. Their idea of exercise is so conservative that it fails to produce enough stress to force an adaptation. LSD is not sufficiently consumptive of oxygen and substrate to cause an actual improvement in aerobic capacity; people get better at moving their feet and pumping and oxygenating blood, but only within the limited context of the easy, infinitely repeatable, short range of motion, low-force non-stress provided by an activity like walking or jogging a 15-minute mile. An actual improvement in VO, max is stimulated only by an effort intense enough to depress O₂ saturation, and that requires more stress than CYA exercise prescriptions are willing to advise. And their model of strength training is funny. The American College of Sports Medicine recommends-for all who consider themselves apparently healthy and adult-eight to ten exercises using a minimum of one set (but maybe as many as three if you are really serious) of eight to twelve repetitions (ten to fifteen if you are frail, in which case you apparently need more endurance work and less strength so that you can continue to effectively maintain your frail status) to the point of volitional fatigue, two to three days per week in a slow and controlled manner through a "full range of motion." In other words, the ACSM wants you to do Nautilus training. But not too hard. And never, ever hold your breath, lest you join the pile of corpses on the floor of my gym that performed the Valsalva maneuver during a heavy set of five squats.

This overly conservative approach to strength training is derived from the version—the only version—of"exercise" that is taught in medical and physical therapy school: rehabilitation. The training of doctors, physical therapists, and athletic trainers requires no formal education in strength training, especially not the effective, barbell kind of strength training used by athletes who are serious about improving their performance. They are taught a method for getting sick and injured people back to "normal parameters," not how to take a healthy athlete from baseline to elite athletics, or even how to make a healthy nonathlete fitter and stronger. Their unwillingness to recognize the difference is the problem they don't know they've got.

> The "S" is usually overemphasized by people doing LSD.

Pop fitness magazines

On the other hand, the folks who publish muscle magazines ought to know better when it comes to legitimate information about strength and conditioning. And they actually do, since significant numbers of them used to be athletes or bodybuilders. They just don't care. (Or, more likely, care more about the quantity in their wallets than the quality in their pages.) Over the past four decades, the fitness media has developed (I won't say evolved) from some fairly informative monthly publications (Peary Rader's Iron Man, Joe Weider's Muscle, Bob Hoffman's Strength and Health) and a handful of newsletters to a landslide of monthly misinformation primarily intended to sell supplements and other advertising. The July 2007 issue of Flex is 56 percent ad copy (179 of 320 pages), and one of the articles is six pages about whey protein. The other articles are all the same, the photography is all the same, and the emphasis is on appearance, not performance.

Muscle and fitness magazines are also largely responsible for giving women who desperately need to build some muscle mass the only excuse they'll ever need to remain flabby: the

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certain knowledge that if they lift weights they'll get "big, bulky muscles," just like Ronnie Coleman and me. They are terribly careless when they prominently feature pictures of female physique competitors who are all too apparently willing to do enough steroids to grow huge muscles without a disclaimer to that effect. The overwhelming majority of the female population is not capable of building huge, masculine muscles, or noses, chins, ears, hands, veins, feet, beards, eyebrows, and all the other little details that separate the boys from the girls. Pictures of females who have taken this rather drastic step in a rather atypical direction should not be viewed by impressionable housewives trying to decide whether to start a weight training program. It's bad for membership sales, and I have to think it can't be terribly good for supplement sales either. Yet the publishers seem to be oblivious to the fact that they have created an objection to be overcome every time an uninformed woman comes into a place that offers more than Pilates, yoga, and treadmills.

And muscle magazines are at least partly to blame for an epidemic of SB concerning teenage boys and young men. A recent trend has developed amongst these little snots that makes it very difficult to put any muscular bodyweight on them: they all seem to think they have to have visible abs, even if it means staying at a bodyweight of 135 pounds. They all want a "six-pack" despite the fact that they don't have an ice chest to put it in. They won't eat breakfast, they eat some type of fast food goo for lunch, and if they eat supper it's because Mom made them. This is intentional, and is their version of "dieting" to keep that trim, fit look.

Now don't misunderstand my concern here: I know that we live in a society largely dominated by fat slobs. Maybe not where you live, but where I live this is true, and I suspect that the vast majority of the United States suffers this unintended result of our economic prosperity. So any drift in the opposite direction is cool, right? Look, when high school and college-age kids come to me and ask how to put on muscle and I take the time to tell them and then they won't do it because they're afraid they'll lose their Washboard Abs, it pisses me off to waste my time with people who ask and then won't listen to what I *know* will work for what they *claim* to be trying to do, and, well, it just gets *aggravating*, you know? And it's all because they actually think that I) if they have abs they'll look like Ronnie Coleman and me, 2) chicks really dig a six-pack, and 3) what does Rip know anyway?

Well, Rip knows that a 135-pound, 5' 9", 18-year-old kid doesn't look like either Ronnie or Rip, even if he has a twelve-pack, and that if he seriously wants to head in that direction the first thing to do is to gain about 60 pounds. Ole Rip also knows that women don't really care about abs. They care about Other Things. And after all, you asked Rip; he didn't ask you. So put down your *Muscle and Fiction*, do your squats, drink your milk, and pay better attention to the answers when you ask the questions.

Advertisers

Next on the agenda are infomercials: the symptom of a healthy economy and a failing public education system, and the primary purveyor of SB in the modern world. This very second, a 30minute TV program is in progress that is predicated on the assumption that you are stupid. Depending on which one you watch, you will be told that sitting in a little rotating chair will give you six-pack abs, that juicing all your vegetables will give you six-pack abs, that jumping rope/dancing to very specific types of music/pretending to kickbox/turbojamming (all of which feature things called "moves") will give you six-pack abs. You might be encouraged to buy an Ab Roller, Ab Lounger, Ab Belt, Ab Energizer, AbTronic, Ab Rocker, Ab Doer, Ab Force, Ab Swing, Ab Rocket, Ab Flex, Ab Dolly, Ab Away Pro, Ab Lifter Plus, Abrageous, FastAbs, HipHop Abs, or 6-Second Abs by the promise that they will give you six-pack abs. The iGallop really looks like fun—Like riding a horse!—and will give you six-pack abs. You might even own a ThighMaster, bought many years ago (Still available today! Call now!) because they promised that it would give you six-pack abs.

Yes, there is a definite pattern here. Cheesy appeals to everyone's desire for the chiseled midsection—which really comes only from hard work, eating correctly, and, in some cases, genetic predisposition—shamelessly offer results to people not willing to pay anything more than money for them. It is always easy, it is always fast, and for some reason it is always *abs*. Even Chuck Norris's Total Gym gizmo, which claims to be better than free weights, dwells on abs, although, in fairness, not quite as much as everything else does.

These devices always promise to take fat off of your belly. Apparently just your belly. Spot reduction—the idea that somehow fat soaks out of your adipose tissue and straight into the muscles you're working right now, or the equally weird idea that fat is loosened in a specific place by some device or a certain aspect of an exercise, travels straight to the kidneys, and is then "flushed out," despite the fact that no one's ever seen any floating in the place it supposedly gets flushed into—is as integral to weight-loss popular culture as Richard Simmons. Spot reduction is really stupid, but I'd be surprised if 95 percent of the population doesn't accept it as fact, because they want to believe so very badly. It's like you were about Santa Claus when you were nine.

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And that's just the stuff that promises miracles with some special kind of "exercise." There are pills on the market that cut right to the chase: lose fat with no work *at all*. None. Cortislim, Zantrex-3, Leptoprin, Propolene, Relacore, Tetrazene, and lots and lots of other products promise effort-free weight loss with various blends of stimulant herbs. It is astonishingly apparent that if there were any pill, any medication, available anywhere that actually worked, there would be only about three fat people in North America. Because aside from those three people who keep showing up on *Oprah* encouraging us to accept them, everybody else wants to be fit and slim, and a pill fits what they're willing to do to get there just about perfectly.

The Internet

Internet "fitness" sites, of course, are not exempt from this tirade. Here is an excerpt from one of my *favorite* websites, www.womensportsnutrition.com :

The skin is the largest organ in and around your body. The skin makes up approximately 80-90% of your body weight and personality. Your skin has trillions of cells which are being replaced every second by the millions. This replacement enables you to keep your youthful look and prevent the aging process. Each cell is made up of memory, intelligence, and energy governed by the nutritional chemistry of DNA and RNA. This, along with hemoglobin, the nutritional part of your blood that makes skin glow, makes up the chemistry that keeps your original, youthful design and separate male and female personality features and characteristics.

Now, I am not clever enough to make up this particularly high grade of SB. It is the work of one Donna F. Smith, C.C.N., C.N. If you happen to live in the greater Wichita Falls area, you could visit her sometime for a Clinical and Sports Nutrition Comprehensive Analysis (CSNCA), \$195, a Comprehensive Health Appraisal (HAC), \$45, or a Deferred Re-Evaluation Analysis (DRA), a bargain at only \$250. What do you suppose somebody who thinks the skin makes up 90 percent of your body weight will tell you about nutrition? (Of course, she says that the skin makes up 90 percent of your personality too, so social interaction with her may be awkward.) The traditional medical community, whose authority "Dr." Smith desperately wants to invoke, has no stranglehold on the supply of SB.

Mainstream Media

If the mainstream media are good at anything it is the mindless

dissemination of hearsay and innuendo. The hairdos of the networks, hairdo-wannabes that work for the TV stations at the local level, the journalism majors who write for the smaller newspapers, and the grown-up journalism majors who write for the big newspapers and wire services are prominent, prolific sources of SB. These people regularly mangle information from everyone else's specialty too, so we strength and fitness folks need not feel singled out. (The enormity of this topic is beyond the scope of this humble venue, but we'll discuss it over beer sometime soon, just you and me.)

Few of the news reports on recently published scientific studies preserve much of the detail of the actual paper, certainly not enough to sort through the generalization errors made by the newsreader hired for his rugged good looks reading gibberish that attempts to summarize a twelve-page paper in four sentences for a lay audience. What starts out as "Peak Power, Ground Reaction Forces, and Velocity During the Squat Exercise Performed at Different Loads" becomes "A recent study finds that exercises with heavier weights should be done at slower speeds. The findings, by Dr. Attila Zink of the University of Miami, Coral Gables, reported this week, determine that the heavier a weight being lifted is, the slower it will move, and the lighter a weight is, the faster it can move." Or, possibly, "A recent study has determined that full squats are bad for your knees." And if you think the news report is SB, you should read the paper: a classic case of garbage in/SB out.

Academics

Which brings up another good point: the academic exercise community cannot seem to understand that poorly designed studies, such as the one above, are not helpful, and in fact add to the general level of SB that gets accepted as Truth. The study cited above, for example, was designed to measure the effects of "squats" on vertical jump performance when done in immediate proximity to the test. The squats they tested were "half squats" and "quarter squats." First, I have no problem with using partial squats in a testing protocol if that's what these guys want to do, but they don't even quantify the movements; they just say that they are "demonstrated in Figures I and 2, respectively." Figure I shows a kid with his knees and hips at somewhere between 95 and 105 degrees, and Figure 2 shows the kid with his knees and hips just barely unlocked; no depth markers, no angles measured, no anything measured, just pictures. This, my friends, is not science. It is guesswork. It might be useful for other scientists to able to reproduce this experiment in case the findings turned out to be unusual, controversial, or otherwise important (they didn't), but without actual standards for the tests used, this would be impossible (even if they did). And, second, and most incredibly, they actually tested a half squat and quarter squat one-rep max! I

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am overwhelmed by the silliness of such a thing. Anybody who has ever trained with weights, who has ever done squats, and who has ever had any personal experience with heavy weights on their back whatsoever knows that you can quarter-squat just about whatever you can load on the bar, because a quarter squat is whatever you want it to be. Five degrees of angle might be worth another 50 pounds, so it matters how deep your quarter squats and half squats are done. It therefore really doesn't matter what the conclusion of the study was; it is SB by definition.

Sadly, this is the quality of a vast amount of the exercise science literature. A high percentage of the published studies have a glaring methodology flaw that renders the results meaningless, or at least suspect. And the reason is that the folks doing the research lack sufficient personal experience with the subject being investigated to understand that they are generating SB. Quarter squats may look good on paper, but unless you have personally taken pride in telling your buddies that you squatted 750—when in reality you quarter-squatted 750 and can only actually squat 395—you don't really have a handle on why your study is SB.

Recently the fad in exercise is "core stability," which apparently is obtained by rolling around on inflated rubber balls and doing very light asymmetrical exercises from a position of unbalance. It sounds scientific, it looks complicated, and it would never have occurred to you, so it must be valuable, right? No. It is classic SB. A heavy overhead squat produces core stability. So does a heavy back squat, especially if you remain stable while you do it. I don't care how hard it is to stay on a wobble board for 30 minutes; it doesn't accomplish anything either quantifiable or significant outside the context of injury rehab, and any type of squats work better. And if you haven't ever done heavy squats, you lack the experience to understand why this is true. Many academics and most physical therapists haven't. ***

What is it that drives the dissemination of silly bullshit? The drive comes from commercial interest (obviously) and ego (amazing!). Donna Smith could use the money; so can I, so I appreciate this motivation. The magazine people want you to keep buying them, and to buy from their advertisers, and if they make sure to hire writers that have "CSCS" beside their names, they have covered their asses. The fine folks who bring you HipHop Abs, the Ab Roller, and Cortislim are counting on the fact that you will probably fail to do your homework. On the other hand, Dr. Mirkin probably isn't in a jam for the cash, so he just likes the idea of being a Fitness Expert in addition to a doctor (and, for all I know, maybe a very good one in his actual field of specialty). The orthopod who tells you that full squats are bad for the knees and they'll stunt your growth, and that you need to just do lighter weights and use higher reps because "they do the same thing," doesn't expect you to pay him for this advice; he's throwing it in for free. He knows he's qualified because after all he is a doctor. The exercise science people have qualified themselves. And the media don't care who's qualified; they just need a story to fill 45 seconds.

The problem is complex, and the solution is simple. It is incumbent on you, yes You, to educate yourself to a sufficient extent that you are in a position to evaluate information issued from a position of authority. You are supposed to be able to recognize silly bullshit when you hear it. And I'm sorry if it's hard to have to think all the time, but the consequences of placing your responsibility to do so in the hands of others can result in a closet full of Thigh Masters, which will make it necessary to find somewhere else to hang your shirts—like on your Bowflex.

Mark Rippetoe holds no truck with SB at 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 been certified as an NSCA Certified Strength and Conditioning Specialist since 1985 and is a USA Weightlifting Level III Coach and Senior Coach, as well as a USA Track and Field Level I Coach. 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.

The Most Powerful Human Being in the Entire Universe

Lon Kilgore

TMPHBITE

For some people, hearing the words "the most powerful human" conjures up images of a spandex-clad superhero oozing muscles and capable of incredible feats of strength and speed. Or maybe it makes you think of a 248-pound fullback driving through a mass of bodies to the goal line. In any case, it evokes a figure who is strong and can move fast. And this is where we begin our quest to understand the critical physical ability of TMPHBITEU, which is the combination of strength and speed—or, more precisely, power.

Power is an easily understood concept and it all begins with doing work. But work here is not the daily 9-to-5 grind, it is the application

of a force to an object with a resulting movement of that object. We can quantify work by knowing the mass of the object moved and the distance it moves:

work = weight moved × distance moved

If I move ten pounds a distance of ten feet, I have done 100 footpounds of work. Pretty elementary. Work is a vector quantity, which means that it has both a direction and a magnitude. What it does not have is a time component. If I move that ten pounds ten feet in ten minutes, I have done the same amount of work as if I moved the ten pounds ten feet in ten milliseconds. Being able to do lot of work in a single effort is associated with being strong. Being able to do a lot of work in multiple repeated efforts is associated with having stamina. But how does work play into determining who the most powerful human is? Again we go back to our bag of physics equations and pull out the equation for power, which quantifies how much work we can do in a period of time:

power = weight moved × distance moved time it takes to move

This relationship between the work done and the time it takes to accomplish it means that the person who can do the most work in the shortest amount of time *is* the most powerful human on the

team, on the loading dock, in the gym, in the factory, in the entire universe, or whathave-you. So, both concepts—work and power—are pretty easily understandable. But with such ease also comes a need for caution. There are two divergent but related types of power that we must comprehend, for each type has a specific application and cannot be considered to be equivalent to the other, although it is quite tempting to do so (and many academics and fitness professionals fall into this trap of confusion).

The first type of power we'll consider is basically "burst" power—the ability to produce large single efforts of work in

very short periods of time. If we consider this in the context of World's Strongest Man contests, it would be something like the keg toss, where the object is to throw a beer keg as high as possible in a single effort. In this instance, the athlete is increasing the force applied to the system in order to increase the distance the keg is thrown. The higher you throw the keg, the more powerful you are. For the power calculation to be greater, the force applied to the system has to outweigh the effects of the increase in flight time caused by a higher throw.

Another example of "burst" power is in the sport of weightlifting. Both the snatch and the clean and jerk lifts are done extremely quickly. In this case, because the distance between the floor and the overhead finish position for a given athlete is constant, the only way to increase power is to increase the force applied. Or we could decrease the amount of time the lift takes, but the magnitude of such a change in this context would pale in comparison to what is possible through increasing the body's ability to produce force. After all, the electrical impulses controlling the rate of muscle contraction already operate in a time frame on the order of milliseconds. While you can improve neural efficiency (cut the number of milliseconds it takes to signal the muscle to contract a tiny bit), you get a much bigger bang for your buck by increasing strength. Just look at the power formula above: if distance does not change and time is only minimally alterable, then increasing force is necessarily the best strategy for increasing power.

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The second type of power we need to analyze is "sustainable" power. This is the ability to carry out lots of work in a longer, sustained, period of time. Using another strongman contest analogy, "sustainable" power is the ability to load a bunch of beer kegs onto a truck quickly. In this instance, a constant weight is being moved over a constant distance, so the only way to improve power is to reduce the amount of time it takes to complete the task. The faster you load the truck, the more powerful you are. This is also the type of power important in endurance sports, since races have set distances and competitors are moving relatively similar body masses. So, because force acts to move only the body and the distance of the race doesn't change, only the rate of work, or power output, is changeable and relevant to winning. Sustainable power is also relevant to the factory floor, the firehouse, the theater of combat, or any other environment where work rate over a finite period of time is important to success or survival.

So who is the most powerful human, the one who can clean and jerk 550 pounds in a few seconds or the one who can sustain 400 watts of power output over a 150-kilometer bike race? Burst power and the big clean and jerk are oranges, and sustainable power and fast bike races are lemons—similar but different. While their units of measure for expressing power generated are the same, they are used in different contexts and are trained in different ways, ways dictated by physiological and physical reality. So when we talk about power, we have to specify what we are talking about before we can categorize. We also have to know what type of power is important to us before we design a training program intended to improve it.

This raises the question "Which type of power is important to CrossFit?" The answer is easy: both. CrossFitters train with weights and improve their burst power. It's one of the key elements of CrossFit. CrossFitters also do metabolic conditioning and improve their sustainable power (stamina and cardiorespiratory endurance). Yet another brick in our foundation of fitness. Can we stratify these two entities' importance and figure out which is most important to the CrossFit system of training? Maybe, but it's really not an either/or game. It is my observation that the bulk of CrossFitters have a goal of increasing sustainable power to support real-world occupations or to support sports performance that occurs over varying durations (rather than specialized performances that entail a single Herculean effort or a single all-out sprint). So, in terms of outcome or application, sustainable power is likely the most important of the two types of power for most CrossFitters. However, in terms of training to reach that outcome, developing both types of power, burst and sustainable, is essential.

Who is the most powerful human, the one who can clean and jerk 550 pounds in a few seconds or the one who can sustain 400 watts of power output over a 150-kilometer bike race?

So how does one develop both burst and sustainable power? Better yet, if sustainable power is seemingly the primary functional goal of most CrossFitters, why do we even worry about burst power? Fair questions. Strap in for an explanation.

Let's tackle developing burst power first. Remember that burst power is improved most efficiently by increasing force generation capacity—in other words, by getting stronger. The most efficient way to get stronger is to use heavy weights, in multiple sets of few repetitions, while doing large-scale, multi-joint, free-weight exercises. If you could squat 125 pounds in 1.25 seconds before starting a program of weight training, and then twelve weeks later you could squat 225 pounds in 1.25 seconds, you increased your burst power capacity. You did more work in the same amount of time so power output increased. This is a fine result but how does this affect improving sustainable power? This is where it gets a little bit tricky in explanation.

Let's use an example from real life to try to shed a little light on this. Say you are standing on the edge of a hay field facing the arduous task of loading several hundred thirty-pound bales of hay onto flatbed trailers. Consider what it would be like to heft those bales of hay up four feet from the ground onto the trailer bed if you were capable of power cleaning sixty pounds. Moving the bale represents utilizing much more than half of your functional strength (remember that a barbell is built to be lifted efficiently, while a hay bale is not). Needless to say there would need to be lots of recovery time throughout the day and the pace of work would necessarily be a bit slow as metabolic demand from having to repeatedly recruit a high percentage of available muscle would outstrip the body's ability to supply a steady supply of energy.

Now, let's take that same hypothetical farmhand, you, and increase your strength to where you can power clean 180 pounds. The relative load that a hay bale represents becomes significantly less stressful, and loading it onto the trailer now requires only about one-sixth of your functional strength capacity. That lower relative load requires less muscle mass for task completion and a lower metabolic demand relative to your previously weaker condition. The result is the ability to load more bales more quickly than you could when you could clean only sixty pounds. So, developing higher burst power is a means to developing a higher sustainable

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power—and that is one of the ways conventional fitness programs fail. They associate improving endurance and sustainable power with unweighted, continuous, long-duration, low-power exercise. They ignore the easy observation that increased strength contributes to improved endurance. CrossFit does not does not make this error.

There is more to sustainable power that we need to discuss. Although stronger is always better, the ability to provide metabolic support at an advanced rate is critical to sustainable power. Think of it like this: if you put some old, partially charged batteries into a remote-control toy car it will move slower and for less time than if you put in a fully charged set of new batteries. For working muscles, stored fat, carbohydrate, creatine, and, ultimately, available ATP are the batteries that supply energy. The sedentary, untrained individual is always running on a partial charge. Appropriate physical training enhances the amount of these energy substrates stored in the muscle and thus increases the battery charge. What is the appropriate training? Met-con. CrossFit metabolic conditioning training improves the ability to do lower-force work (relative to maximal effort) at very fast rates, which necessarily improves sustainable power and does so far more efficiently than traditional endurance training.

So who is TMPHBITEU? Is it a burster or a sustainer? I've seen Anatoly Pisarenko, who holds the record for doing the heaviest clean and jerk in the entire universe, up close. I've seen Andrei Chemerkin playing with 240 kilos like it was a baby's rattle. I've seen John Godina throw a shot put farther than my wife can throw a baseball. These are monsters of burst power. But they are monsters who do little metabolic conditioning and who are not concerned with being physically prepared to produce sustainable power. I've spent many years working to make specialized athletes similar to those guys. Given their goals and training methods, even if you wanted to assess their sustainable power, you probably couldn't get them to do any exercise testing activity that took more than a few seconds.

My experience with monsters of sustainable power is more meager: a couple All-American cross-country runners, a few elitelevel road cyclists, a couple track cyclists, a Channel swimmer, and a few other miscellaneous high-level athletes who needed serious sustainable power to compete well. In this vein, Lance Armstrong produced many many watts of power during the arduous hours of his long cycling races. His ability to maintain a high work rate for long distances made him an indomitable monster of sustainable power. If I actually knew the names of winners of the Boston or Olympic marathons, I could also point to them as monsters of sustainable power production.

But is there a monster division for the best of both worlds of power production? There might be a case made for a decathlete as a monster of mixed power production. But there are many other examples of strong people who do lots of work really fast but who do it in situations where measurements are neither done nor desirable. That makes this category very difficult to assess. On a recent visit to CrossFit San Diego I had the pleasure of meeting owner and Navy SEAL Eddie Lugo and seeing him do some weight training. He is one strong CrossFit guy who can do a lot of physical work fast. In my view, he is a monster of combined power. But he doesn't really care what I think about his power capacity. Where fitness and power matter really to him is in the special warfare environment. And there the only measure of the benefit of possessing both burst and sustainable power of importance is survival and mission success. Survival and mission success aren't variables we can or want to test in the lab or in competition.

So where does this leave us? Given that CrossFit training develops a balance of burst and sustainable power—that it "increases work capacity across broad time and modal domains," as Greg Glassman puts it—maybe TMPHBITEU is out there in the ranks of CrossFitters around the globe. And maybe, just maybe, the first annual CrossFit Games (June 30 – July I, 2007) will be a first step in determining his identity.

Lon Kilgore, Ph.D., is not TMPHBITEU. But he 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, *A* and the forthcoming Basic Barbell Training.

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Teaching the Jerk Part 3: Split Jerk Drills

Mike Burgener and Tony Budding

In our previous two articles in this series, we covered the two most important aspects of the split jerk separately. All the Olympic lifts consist of merely jumping and landing with the barbell in various positions. In May, we discussed the jump (dip-drive) for the jerk as performed with the barbell on the shoulders behind the neck, as that is the simplest version. In June, we covered the proper landing (receiving) position for the split jerk. In this article, the ninth in our series on teaching the Olympic lifts, we put them together with a progression that develops into a full clean and jerk.

With decent instruction, most people can, without too much difficulty, learn the proper landing position for the split jerk and learn to jump the dowel, PVC pipe, or light bar through a range of motion, receiving the bar overhead with the legs in a partial lunge. Most of these same people will find their mechanics deteriorating as they approach maximal loads (and many long before maximal). For this reason, we have developed a series of drills that can be used with increasing loads while reinforcing or even improving the mechanics of the movement.

Behind-the-neck drills

The first two movements in the sequence were described in our May 2007 article. They are the behind-the-neck (BTN) push press and the BTN push jerk. Special care should be taken in the dipdrive to ensure that the body and bar travel only vertically, with no horizontal movement—i.e., without letting the bar drop toward the front in the dip. In this initial sequence, the movements should be practiced without the optional squat.

The third movement in the sequence is the BTN split jerk. Once the athlete is handling the push jerk behind the neck with success, the athlete may progress to the split jerk behind the neck. The starting position is the same as in the push jerk and in the initial dip and drive from the legs. The athlete drives the barbell up, extending the hips, knees, and ankles to create momentum, and instead of simply rebending the legs to land in a quarter squat as in a push jerk, the athlete jumps the legs into a quarter lunge, or split, position, receiving the barbell with arms fully extended overhead. (This position was explained in our June 2007 article.)



As stated before, working from behind the neck is an easier way for beginners to start than from the front because the barbell can travel vertically without having to negotiate the face. Still, it is essential that the torso remain completely vertical during the dip-drive so that barbell is propelled vertically. The margin for error decreases dramatically as the load increases. In the squat



and deadlift, the torso angle shifts forward as the bar descends. In the push press, push jerk, and split jerk, the torso remains vertical without any forward inclination at all.

Combination jerk drills

The next step in the progression is to repeat the three movements in order, but starting with the barbell on the shoulders in front of the neck. Notice in the picture that the hands and arms are in a different position from that for the rack position in the front squat. The hands and fingers should grip the barbell completely but loosely just outside the shoulders. The elbows should be below the shoulders but in front of the barbell, with the upper

Split Jerk Drills

...continued





Push Jerk

Online Video

http://media.crossfit.com/cf-video/BurgPushPress.wm

Split Jerk

arm at about a 60-degree angle in front of the body. The barbell should be in full contact with the shoulders (though this may be difficult with light bars or PVC).

The three movements are initiated with a complete inhalation. The athlete should consciously fill the belly with air, creating a pneumatic brace throughout the torso. Inhaling completely and holding before the movement begins also encourages consistency and "tightness" in movement (whereas inhaling or exhaling during the movement leads to inconsistency and typically introduces some unwanted, and unsafe, laxity). The torso should remain

Warm-up or workout sequence

In competition, the jerk always follows a successful clean. In order to prepare the athlete for this sequence, you can add a squat to each of these exercises. For example, instead of starting with the feet in the jumping position, begin with the feet in the landing position and perform a squat (back squat for the three BTN variations, and front squat for the other three). At the top of the squat, remember to walk the feet back into the jumping position before the dip drive. You will probably also have to reset the grip and perhaps lower the elbows somewhat after the front squat to prepare to thrust the barbell overhead as you drive your body down into the split. Finally, you can end the sequence with a full clean and jerk (see our April 2007 article for an explanation of the clean).

These six exercises can be performed in sequence with PVC as a warm-up. Once there is proficiency in the movements, the sequence can be performed with the squats and cleans with gradually increasing loads as a workout, as follows:

- I. Back squat and BTN push press
- 2. Back squat and BTN push jerk
- 3. Back squat and BTN split jerk
- 4. Front squat and push press
- 5. Front squat and push jerk
- 6. Front squat and split jerk
- 7. Clean and split jerk

In next month's article, we will cover further skill transfer and remedial exercises for the jerk.



Push Press «

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

by keeping the chest up, flexing the hips ("butt back"), and pushing the knees forward a bit in the dip. The tendency to initiate the movement by sliding the hips back and dropping the chest should be avoided at all costs. Any forward inclination of the torso will throw the barbell forward, which greatly complicates the bar path and decreases the likelihood of successfully receiving the barbell overhead.

Principles of Physiologic Conditioning

🖌 🛛 Tony Leyland 🛛 🔨

Athletes, coaches, and trainers familiar with CrossFit know that it works. However, I find that some are nonetheless hungry for more explanations of *why* it works.

The term "physiologic conditioning" refers to a planned program of exercise directed toward improving the functional capacity of a particular bodily system. There are four basic principles of physiologic conditioning that trainers and athletes must take into account:

- overload
- specificity
- reversibility
- individual differences

Although this model has existed in the athletic community for decades, I believe that it helps us understand some of the reasons behind the efficacy of CrossFit programming. And, furthermore, because CrossFit is such an effective example of the principles in action, it functions as a test—and confirmation—of the model's value.

Overload: Adapting to the amount of training

The one thing that is totally consistent in the research literature is that if you work the body harder than it is used to, it will adapt and improve in that area. You simply have to stress the body to realize any fitness gains. The overload principle is complex isn't it? It must be, if people actually believe sitting on a recumbent bike spinning their legs in a circle while reading *People* magazine is going to provide effective overload. I have a sense that we didn't evolve gathering food or hunting animals while leaning on a backrest. You might as well just think of "recumbent"—or any other word that suggests comfort and ease—as a synonym for "ineffective."

However, the simple concept of overload, by itself, does not help you to determine the *best* program. For people accustomed only to sedentary effort, pretty much any exercise, no matter how moderate, is going to overload them and produce results. Mark Rippetoe addressed this point in some detail in his article "Training Advancement and Adaptation" (*CFJ* 53, January 2007), where he discussed the fact that gains will come slowly for good athletes with years of training experience because, simply put, they are already approaching full realization of their genetic potential and it is therefore difficult to "overload" them in an effective and progressive manner. Training programs for intermediate and advanced athletes must take this into account.

Physical training overload can be accomplished by increasing any (or a combination) of the following three parameters: frequency, intensity, or duration. Obviously we can simultaneously increase more than one of these parameters, but we must be careful not to overtrain by indiscriminately increasing all three at once early in the program. Someone starting in CrossFit would probably not train on the 3-days-on, I-off cycle and would have to scale intensity downwards. As they progress and establish consistency, frequency and duration tend to stabilize (for reasons having to do with both the realities of scheduling and the nature of highintensity—i.e., non-sustainable—exercise), but the intensity will continue to increase.

Coach Glassman has repeatedly seen improvement over a ten-year period with athletes who are dedicated to CrossFit training and proper nutrition. In order to ensure this continued improvement in physiologic capacity during training, the relative degree of overload must keep pace with the adaptive changes that occur both in physiology and performance. Before long, you will not realize any further training effect if you maintain the same frequency, intensity, and duration of work. The observation that athletes reach training plateaus quite quickly and often struggle to attain further fitness gains led to the development of formally periodized training programs in the late 1950s.

Periodization, in the athletic training sense, is an organized approach to training that involves progressive cycling of various aspects of a training program over specific time periods. The concept of periodization comes from Hans Selye's model, known as the General Adaptation Syndrome (GAS), for describing biological responses to stress. If you ever took Psychology 101 or learned anything about "psychological stress," you probably came across GAS. What is less common knowledge is that Selye's work on the body's response to positive and negative stressors (exercise, in this case) is applicable to athletic training programs and has in fact been used by the athletic community in the development of periodized programs since the late 1950s. (A recent major contribution to that literature, of course, is Mark Rippetoe and Lon Kilgore's recent book *Practical Programming for Strength Training*.)

Periodization and the research on its efficacy is most widely used in resistance program design to provide an effective overload and avoid overtraining. Periodization systematically cycles the focus the frequency, duration, and intensity—of training and incorporates lower-workload or "transition" phases. These "transition" phases are essential rest periods designed to allow tissues to repair and fuel substrates to be restored, etc. If you rest longer than you need to, you will not improve fitness at the rate you could improve, but inadequate rest can cause injuries. This is the real skill in program design, to be able to get athletes to work hard and improve physical fitness levels at an optimal rate without causing overuse injuries or systemic overtraining (negative stress).

Russian physiologist Leo Matveyev and Czech sport scientist and Olympic coach Tudor Bompa are regarded as the fathers of modern periodization. Bompa's training phases last between four and eight weeks, after which the number of reps and sets and the selection of exercises are altered. CrossFit does similar, though its "period" is much shorter—it varies exercise, energy systems, loads, and volume day to day. And although this level of "periodization" has yet to be well studied, we do know it works well.

So, while CrossFit is not a periodized program in the traditional sense, I believe that it contains many similar elements. CrossFit

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challenges the body to adapt to constantly varied movements, intensities, and durations. This is why the literature on periodized programs shows periodized programs to be better than fixed ones; they challenge the body's adaptive powers better. CrossFit takes this challenge even further by constantly varying the form of overload as well.

CrossFit's "World-Class Fitness in 100 Words" gives the following prescription for variety:

"...mix these elements [CrossFit exercises] in as many combinations and patterns as creativity will allow. Routine is the enemy."

"Routine is the enemy" is essentially a restatement of the overload principle. Routine is to be avoided for three main reasons. First, as discussed above, research has consistently shown that athletes quickly reach plateaus in training. The second reason to avoid routine is to make you work on your weaknesses. You can easily avoid your weaknesses when sticking to routines. How many people come to CrossFit after doing lots of single-mode aerobic work and some high-rep low-weight resistance training and then say "Hey, I thought I was fit...but I just found out I wasn't." Well their aerobic conditioning (in their favorite modality) and muscular endurance may have been good, but those are only two out of ten components of fitness! You can't hide from your weaknesses when following CrossFit programming.

The third reason routine is the enemy is that sticking to a routine is boring (for most of us anyway). I am not a psychologist, but it is important not to forget the motivational aspect of CrossFit. Variety maintains interest (and therefore effort) better than remaining on a fixed program. Although traditional periodized programs keep things changing and interesting, the variety is on a much smaller scale. I come from a competitive sports background, and I am accustomed to varied stimuli, constant change, and an element of unpredictability.

The incredible variety of CrossFit programming is sometimes described as "random." But is it really random? No. With a truly random program you could theoretically get three CrossFitTotals in a row, or three IOK runs in a row. But research and coaching experience shows variety in a program is crucial, and mixing the program up so much that it almost looks random may be the best way to train and to challenge your adaptive ability

Specificity: Adapting to the type of training

Specific exercise elicits specific adaptations. Elite specialists can be spectacular in their one event. For example, running 26 miles all at sub-five-minute-mile pace is mind-boggling, but you will never see an athlete who can run a 2.5-hour marathon *and* can also deadlift 700 pounds. So specialization does come at a cost. Give that elite marathon runner a 95-pound thruster workout and things could get ugly. If you truly want to be impressed you will find CrossFit athletes with 500-pound deadlifts, 3-minute Frans, sub 40-minute 10K runs, 4.5-second 40-yard sprints, and greater-than-

bodyweight clean and jerks. Now that is impressive across the entire spectrum of human performance.

There is a real price to pay for being a specialist at every level, and especially at the elite level of most sports. In his book *Lance Armstrong's War*, Daniel Coyle explains that Tour de France cyclists don't like to walk. He even states that they will get out of breath walking up stairs! Their white blood cell counts tend to be 30 percent below average and their bodies become vulnerable to colds and disease. They push elevator buttons with their elbows to help avoid germs. And they are skinny—very skinny. Here is a quote from Coyle's book.

"Tour riders are skinny, far skinnier in person than they look on television or in photos. Their upper arms are so slender that you could almost wrap your thumb and index finger around them. The wife of one American rider says she can tell the Tour [Tour de France] is drawing near when she can start to see her husband's internal organs—his liver, his kidneys beneath his skin."

This is an incredible indictment of specialization. Sure these athletes have amazing cardiorespiratory fitness (VO₂ max) on a bike, but make them run and they burn out way faster than you would imagine. Don't even think about having them do 150 wall ball shots. Obviously the systemic components of their VO₂ max (lungs, heart, and major arteries) are going to be important for running distance. So they are able to train and adapt more quickly than sedentary people to other modes of long-distance cardiovascular work (Lance Armstrong ran a marathon in just under three hours after some training). But the fact remains that specialization is for insects...whether you like that fact or not. (See my article in *CFJ* #52 if you want to review VO₂ max and why it is mode-specific).

The specificity principle also explains why some athletes adapt quite quickly to CrossFit programming. A good rugby player, for example, would have good upper- and lower-body endurance, strength, and power and good speed to get around the field. And the interval nature of the high-intensity sprint work in the sport would have ensured a decent VO_2 max. Rugby players also have to coordinate their movements into specific skilled movement patterns. So, because of the variety of skills and fitness components required in the sport, a good rugby player starting CrossFit will likely make faster progress than most other athletes.

Focusing just on CrossFit training will provide the most balanced improvement in all components of fitness, but you have to do what you love if you want to maintain your skill and capacity at that. (And, remember, CrossFit's recipe for world-class fitness includes the following prescription: "Regularly learn and play new sports.") Just be careful of specializing and be aware of its costs. Personally I have to be playing some sport, but CrossFit allows me to work on components of fitness not stressed by my sport in a really fun and effective way.

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Reversibility: Adapting to a reduction in training

The reversibility principle is also known as the "use-it-or-lose-it" principle. Once you reach a desirable level of physical fitness, a regular program of activity must be maintained to prevent deconditioning or a loss in functional capacity. I find, however, that mere maintenance isn't much of a CrossFit concept! CrossFit athletes are always looking to improve their performance. The use-it-or-lose-it principle is pretty obvious, so why do many people "fall off the bandwagon" after starting an exercise program? The underlying answer to that probably involves one or more of the following reasons:

- They worked out at such low intensity (like reading a magazine while they move their legs in a circle) that they just didn't see enough improvement to warrant continuing.
- They had some fitness gains but they reached a plateau fairly quickly and they stopped seeing improvement.
- They injured themselves by overdoing it and became demoralized. (A visit by Pukie at every workout will have this effect as well.)
- They got bored with their program.

Sure everyone can say, "I got too busy" or "I couldn't find the time" (this is the most common reason people give for not exercising). But if they were realizing great fitness gains and having a lot of fun doing it, they'd stay. So I am sticking with that list above as the root cause of the problem.

From that list, though, CrossFitters probably only need to worry about the possibility of overdoing it. I am just saying what we all already know: that workouts have to be appropriately scaled. This is very different from the mindset that exercise should be "comfortable" or that the key elements of the program should be compromised. As newer CrossFitters progress, they have to keep pushing the boundaries, as required by the overload principle. Intensity is required, but it is also individually variable.

Individual differences: Limits on adaptability

We cannot expect all individuals to train at the same work rate and to respond to a given training dosage in precisely the same manner. Most people realize that there are limits to the adaptation they can achieve. Look at the records boards on any CrossFit gym. You'll likely find some names that recur frequently, but the top performer is probably not the same across the board, on all the benchmarks.

Some athletes quickly adapt to aerobic training and can achieve a very high level of aerobic performance. However, for these athletes strength training is often harder and strength gains and ultimate strength limits are far less impressive. And vice versa for anaerobic monsters, who tend to abhor anything that involves the aerobic pathway. In addition to genetic predisposition, an athlete's age and sex are also relevant factors. As a 51-year-old, I can't achieve the strength gains I could back when I was 25. The bottom line of the individual differences principle is that training benefits are optimized when programs are planned to meet the individual needs and capacities of the participants. One size does not fit all. Group workouts are a lot of fun and a great way to train a number of athletes at once. But be selfcritical. If you need additional flexibility work (like me), do it. If you need to improve your lifting, or your gymnastics skill, or your running performance, do some extra practice or training in that area outside the WOD. Be creative and design some personal workouts that target your specific weaknesses.

If you are unsure about personalizing aspects of your training outside of the WOD, look at what you excel at. Do you do better at strength workouts like maximum deadlifts, presses, etc? Are you a maximal burst power athlete with good Olympic lifts and 20yard sprints? Or are you better at more sustained high-power outputs, with low times on "Grace" or "Fran," or at cardiovascular endurance tasks such as 5K runs? Maybe you excel on bodyweight stamina workouts such as "Barbara" or "Angie." Where do you have to scale things the most? The answers to these questions will direct you toward the other things you need to pay attention to. The good news is that you can improve on those weaknesses. Although there are genetic, anthropometric, age, and sex limits on how, and how much, you will adapt, tackling your weaknesses head-on and making sure that your training adheres to the four basic principles of physiologic conditioning will put you well on your way to elite fitness.

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Studies and texts cited in this article

Bompa, T.O., L. Di Pasquale, and U. Cornacchia. 1998. Serious Strength Training: Periodization for Building Power and Mass. Champaign, Ill. Human Kinetics.

Baechle, T.R., and E.W. Earle, eds. 2000. Essentials of Strength Training and Conditioning. 2nd ed. Champaign, Ill.: Human Kinetics.

Coyle, Daniel. 2005. Lance Armstrong's War. New York: HarperCollins.

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-I CrossFit trainer. He can be reached at leyland@sfu.ca.

Kelly Starrett

Stretching sucks. It does. There, it's been said. You can't brag about your best stretching time, you don't get to write your stretch PR on the wall, and there is no immediate "Fran"-like gratification that you are really tough. And despite the fact that flexibility is one of the ten CrossFit pillars of complete, well-balanced fitness, increasing flexibility potential remains the ungreased squeaky wheel of most athletes' training programming. According to the ten general physical skills list, flexibility is allegedly as important as power or strength. So why don't we take it more seriously? Because, typically, we simply fail to frame flexibility in terms that are important to us: increasing performance.

Stop kidding yourself. Lacking flexibility in crucial areas has a crushing impact on your athletic abilities; to say nothing of the host of pains and problems that inflexibility predisposes you to. If you know you have tight hips, calves, hamstrings, quads, thoracic spine, or shoulders and aren't actively, aggressively striving to fix them, then you must be afraid of having a bigger squat, faster rowing splits, or a more explosive second pull. Or, you must be very lazy. Because if you are tight and a CrossFitter, you are missing a huge opportunity to get better, stronger and faster. Simply put, not stretching is like not flossing, and the results are not pretty. There are many areas of restriction in the typical athlete, but it makes sense to begin a discussion about flexibility and performance at perhaps the most commonly neglected and profoundly underaddressed area of the body, the hamstrings.

The goals of this article are to help you understand how hamstring restriction impedes performance and function, learn to identify tight hamstrings with a few simple assessment tools, and above all, know how to address the problem.

Physiology and function

Before examining a few movements that are greatly affected by short hamstrings, we should touch on a few salient points about anatomy and function. Every athlete should know that the hamstrings are both a hip extensor (they help extend the thigh, or open the hip) and a lower leg flexor (they bend the knee). The important piece of information here is that the hamstrings cross both the knee and the hip. Hamstrings are two-joint muscles. This means that tight hamstrings will affect the knee and also the hip and back. This is important because most of the typical musculoskeletal complaints involving the knee, hip, or back typically have short hamstrings as a confounding variable. That is, explosive hip-based movements will often have consequences at the knee because taking up a lot of slack at one end of the muscle (the hip) will steal length from the other side (the knee). And this is true the other way around as well. In fact, muscles that are too short to stretch to meet the functional demands of a desired movement are said to be passively insufficient.

For example, it is well known that the quadriceps (also a two-joint muscle) help stabilize the pelvis and control the eccentric loading that occurs in the knee in, say, squatting. The quads also play a role in straightening the lower leg, of course, but that task is and should be the chief domain of the hamstrings and glutes through hip extension. Now if an athlete's hamstrings are too tight or aren't of sufficient length to allow full extension of the lower leg (knee) when the hip is loaded in a flexed position (i.e., rowing, deadlifting, running), then the quads have to overcome the passive insufficiency of the hamstrings and also bear their load to boot. Not only does this typically predispose the athlete to possible knee pain and future pathology, but it is the equivalent of driving your quadriceps around with a gigantic hamstring brake on.

Despite the fact that flexibility is one of the ten CrossFit pillars of complete, well-balanced fitness, increasing flexibility potential remains the ungreased squeaky wheel of most athletes' training programming.

Want your quads to work more efficiently? Well then quit giving away your hard-earned strength, speed, and power potential because of your tight posterior legs. And when Olympic gold medals are determined by margins of I percent or less, you had better believe that passive drags on the athlete's function, like tight hamstrings, matter. They need to be systematically addressed.

To test and illustrate the passive insufficiency concept (the quadriceps brake metaphor), sit up with a straight back on a table with knees bent over the edge, the backs of your legs touching the side or hanging perpendicular to the ground, and your feet off the floor. Now sit up tall and position your low back to mimic the same lumbar curve you would have while squatting. Next, without reversing or losing the good position of your low back (have a partner watch so that you don't cheat, because almost all of you will try to cheat), extend one of your legs. If your hamstrings are tight, you won't be able to completely straighten your leg unless you give your hamstrings some slack by letting your lumbar curve collapse so your pelvis can tilt posteriorly. Now try it with both legs at the same time. Unless you've got great hammie flexibility, chances are you weren't able to extend all the way. Of course, despite that fact that most of you couldn't straighten your legs on the table, you will straighten you legs when performing real movements. Your quads have little functional option but to drag your hamstrings (and subsequently your pelvis and low back) along if a fully extended knee is going to be achieved. Diagnosis: hamstrung.

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Sitting tall at the edge of a table with a good natural lumber curve.
Extending a leg leads to loss of the lumbar curve.

3. This is as far as she can extend the leg without losing the lumbar curve.

Now, lower your legs and repeat, but this time pay attention as you straighten them through the movement arc. At what point of the swing arc do you start to notice resistance? It is likely that you didn't encounter the full and immediate resistance of your hamstrings at the end of leg extension all at once. It is likely that your hamstrings started to gradually tighten. In most athletes with significant hamstring restriction, resistance to lengthening starts early and builds throughout the available range of motion. Remember, your quads have to overcome this hamstring inertia to do their job. This means that you're giving away force potential in even low-power activities like walking. This brutal phenomenon is particularly visible in rowing where an athlete with short hams will always achieve full leg extension before the end of the pull.

Let's have a reality check for a moment. Does failing this quick test mean that you can't squat 400 pounds, or rip off a sub-three minute Fran? No. In fact, most of you probably failed that sitting test and still have impressive performance numbers. And you probably use these high performance measures as rationalization that you don't need to do anything about your tight legs. But just imagine for a moment how much more you might still have in the tank if you simply eliminated any potential hamstring "drag". You would certainly get better gas mileage in your car if you didn't drive around with the emergency brake on. Again, we aren't interested in stretching our hamstrings (just) to avoid back pain when we're ninety (or thirty) years old; we're after being fitter, faster, and stronger now.

So tight hams make your quads work harder than they should have to. But there's more bad news. Tight hamstrings also have limited ability to generate force when they are put under load at



I. Muscle fibers overlap significantly, like this, in their optimal working range

2. Overly stretched muscle fibers, at the end of their working range, look more like this and cannot generate force as well

the very end of their available range. Muscle force production is greatly affected by where in the range of motion the muscle is asked to generate that force. This is known as the length-tension relationship. More specifically, the length-tension relationship means that force (tension) generation in skeletal muscles is a function of the magnitude of the overlap between the functional contractile units of that muscle. Or, in plain English: overly stretched working muscles are weak muscles. You have actually experienced this for yourself many times. For example, most athletes will have noticed that they are much stronger at the mid-range of a movement like a pull-up or squat than they are when the relevant muscles are under peak stretch. As human beings, our muscles are set up so that their internal structures allow for optimal overlapping of the base contractile units. This is why force is typically optimized in a muscle that is working in mid range. The inherent design flaw with this is that the further you move the muscle away from the optimized working length (like the hamstrings at the bottom of the squat), the less force the muscle is capable of generating. This is why heavy guarter squats are very popular and heavy full squats are not. If you are in hamstring length denial, you are not only making the muscles opposite the hamstrings work harder, but you are limiting the potential force production of the hamstrings themselves because you are placing the muscles into an early position of diminishing "end range" force.

But wait, it gets worse. Because we are trying to shift stretching rationale away from injury prevention and toward performance improvement, this article would be remiss if it did not point out that your lack of hamstring length also affects your functional application of force in movements like the squat and ultimately reduces the effectiveness of your body's natural leverage and range of motion in these very fundamental movements. In squatting, for example, everyone knows that tight hamstrings bring about a whole host of gross mechanical errors, from knees way out past the feet to lifting the heels to horrifically unsafe rounded backs.

But what about you, with your big, safe, CrossFit Total-tested squat? Well, there is a point in everyone's squat where the athlete's lumbar curve will begin to reverse itself. It is at this point where biomechanical positioning starts to be less than optimal. In world class weightlifters this reversal point tends to be in the squatting

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Just hitting the point of lumbar reversal (left), and deep in the hole, with excess reversal (right).

range where the butt starts to meet the ankle. For folks with less than ideal flexibility, it's likely that the lumbar curve starts to reverse well above the point where your hip crease is level with your knee. Remember, losing your lumbar curve early means that your hamstrings are working at end range and are their weakest earlier than is desirable. But now, your end-range weakened hamstrings are starting to affect your body's inherent ability to optimize movement leverages.

Try it for yourself: Get into a good squat position and have someone watch you descend. Your partner will say "stop" the second you start to lose your tight, perfect, slightly arched spine positioning. Note this depth because from here you are becoming less efficient the farther down you go. Know that very strong athletes might reverse relatively early, have safe squats, and still generate huge amounts of force, but this discussion is about optimizing work capacity, and the earlier you start to lose your lumbar curve, the earlier you are beginning to mute your hip function (and violate optimal length-tension relationships, etc.).

Improving hamstring flexibility

To start, get a baseline measurement of your hamstring length. You need to assess flexibility in two ways because, remember, the muscle crosses two joints. First, lie on your back and have a partner pin down your left leg at the hip. Now have your partner lift your right leg, keeping the knee straight. The partner should be aware of when they first start to notice significant resistance and when your pelvis starts to move at the end of the leg lift. This point is the end of hamstring range with the leg straight. The



Hamstring assessment with knee bent 90 degrees

Hamstring assessment with straight leg



Lumbar reversal just beginning (left). Note that reversal begins earlier (above parallel) for this athlete than for the one pictured above, but in his full squat (right) the reversal remains minimal (nearly neutral) and he keeps a tight position, with active hips and hamstrings.

partner will likely be able to push farther, but they are really just starting to drag the hips along with the leg.

The angle the raised leg makes with the ground is the measured position. Normal range is considered to be between 80 to 85 degrees of motion. And this amount works fine for the average non-performance-obsessed person. But you want to be greedy; more is better in this case. Now have your partner repeat the test, and see if they can feel where in your range of motion they begin to notice the hamstrings getting tight. On this, later is better. Your goal is to have a sudden onset of resistance that builds quickly to the end of the range of motion. It is not cool to have hamstrings that are "stiff" during the entire time your leg is being straightened.

Now repeat the test but this time bend the knee to ninety degrees to start. This method of looking at hamstring length usually does a better job of telling the truth because the straight-leg method is fraught with ways to compensate. Again have your partner straighten your leg. When they reach that position of obvious resistance, note the position. Your partner will be able to straighten your leg with enough force, much like your quads can, but they are simple stretching collateral connective tissue at this point. In the fully stretched position, you leg should be no farther than 20 degrees from straight up and down. Where you able to hit 80 degrees? This length would earn you a "C" grade in hamstring flexibility. While this is adequate for most people, it is not for us. Now apply a little bit of "CrossFit" motivation and record everyone's hamstring ranges on the wall. Create awards for "hams of shame" and "hams of fame."

Hopefully the case has been made by now that: 1) increasing the flexibility of your hamstrings will improve your performance, and 2) your hamstrings are tight. So here are some quick and dirty ways to slay these performance-sucking vampires. The rules of best practice stretching are simple.

 Keep performing full-range functional movements, the way you already do. In reality, your body is actually going to have to add functional contractile units to your muscles

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over time to actually make your muscles longer. This is why most people become more flexible when they start CrossFitting.

- 2) Stretching before a workout is less than ideal as it alone will not prepare you very well to perform actual work. Stretching immediately afterward is always desirable. Don't just jump in your car and head to work right after finishing "Diane"; give your hamstrings five minutes of loving. However, if you are severely limited by your flexibility, to the extent that it interferes with your training, get really warmed up, stretch, then do your workout. Yes, pre-workout stretching can blunt one's potential for generating maximal force production, but if your workout is compromised by your inflexibility, the benefits way outstrip the potential drawbacks here. If you are that tight, get to workout a little early and do the responsible thing.
- 3) It is OK to stretch anytime, especially in the way outlined below. Is it better to be warmed up first? Yes, of course. But in the morning, for example, you can take a hot shower and have your cup of coffee and then stretch, as you should be warm enough.
- 4) Stretch often. Muscles are like obedient dogs. They need constant, repetitive training. One session of stretching lasting one minute isn't going to change anything. Stretching big muscles like hamstrings and quads takes time. Ninety seconds per leg should be a baseline, five or six times a day.
- 5) Make stretching something you do while doing something else. Stretch your hamstrings while seated at your desk at work. Stretch in front of the television. Stretch every time you check the CrossFit website (well, OK, maybe not *that* many times). The point is, don't make a big deal of it. Grease the groove. Develop a reputation as that "stretching guy."
- 6) Don't bend over and touch your toes in an attempt to stretch your hamstrings. This is a rookie mistake and primarily a low back stretch. You can't very well stretch a muscle that is working hard to keep you from falling over.
- 7) Stretch the hamstrings over both joints. This means that you should stretch with the leg straight and stretch with the knee bent. (See photos.)



Use something like a jump rope, stretch band, or towel to gently pull the leg up and back when stretching by yourself.

8) Attack stretching your hamstrings with the same fervor you gave to getting your first pull-up or muscle-up or handstand. Become obsessed.

How to stretch your hamstrings

A proven, effective method to stretch hamstrings is called contractrelax. It comes from a fancy method of physical rehabilitation called PNF (proprioceptive neuromuscular facilitation). Using contract-relax stretching, you are basically trying to reset the resting length of the muscle itself. The same is true of stretching techniques like isometric shutdowns, or reciprocal inhibition. But we're not arguing about which technique works best; we just want to stretch. For most muscles, the contract-relax method described below is like a miracle.

To use contract-release to stretch your hamstrings, lie on your back, extend one leg, and lift it up and toward your chest as you did in the testing positions described at the beginning of this section, so that the hamstrings being stretched are at their end range in either the straight-leg or bent-knee position. You can perform the straight-leg variation while sitting in a chair at work. Now, without actually moving the body, and maintaining tension at the hamstrings' end range, try to generate a force in the muscle that is about 25 percent of what you think you could maximally produce. It is likely your quads will kick on too as you do this; this is OK. It should feel like you are trying to rip the hamstrings while they are under load. Hold that contraction for about five seconds, and then relax the muscle suddenly, like you are turning off a light switch. Next, take up the newly created slack in the muscle by extending a little farther and hold for about ten seconds. Start again with the contraction-and-release cycle. Repeat this process about five or six times. After stretching the hamstrings in both knee positions (bent and straight), stand up and enjoy the changes.

To sum up: you are not as efficient as you could be if you have tight muscles that are getting in the way of your athletic potential (and you probably do). You can change this even if you have been telling people for years that you just aren't flexible. No excuses.



Kelly Starrett will be receiving his Doctorate of Physical Therapy at the end of July 2007. He and his wife, Juliet, are the owners and operators of San Francisco CrossFit. Kelly < is a former member of the U.S. Canoe and Kayak Team, a former National Champion whitewater paddler, a nice guy, and a good, flexible dancer.

Dumbbell Conditioning for Rotational Strength and Health

Michael Rutherford

As you look everywhere in the sporting world you see athletes performing sports with a rotational component. In sports such as baseball, tennis, and golf, the athlete must transfer ground forces through the middle of the body to the upper extremities. Without getting into physics involved, suffice it to say that those with weaker rotational strength and experience will not be as successful and will most likely end up with aches, pains, and possibly even injuries. A little preparation and prevention goes a long way.

In this month's Dumbbell Coach article, I present the three-step process I use for improving rotational strength and health.

Step 1: Get good at overhead squats

The first step in developing rotational strength is to get weight above the head. This triggers the musculature about the lumbar region to work in stabilizing the area. Basic strength in this area lays a good foundation for more complex moves and addition strength-endurance conditioning later.

Overhead squatting is the launching pad for this activity and, in my opinion, provides the biggest bang for your rotational training buck. Building your capacity at overhead squatting is one of the keys to foundational core strength. Single-arm overhead dumbbell squats offer the added advantage of requiring unilateral stabilization and exposing imbalances so that the athlete can correct potential problems or avoid injury. Overhead squatting your bodyweight on a barbell for fifteen reps or performing a single rep with bodyweight plus 25 kg is a sign of elite ability.

Building your capacity at overhead squatting is one of the keys to foundational core strength.

Step 2: Get into shape

A sound conditioning base is critical to proper execution of any sport skill. Those activities that include a rotational component require keen coordination of movement and demand that all the muscles work together. As an athlete fatigues due to lack of conditioning, the potential for injury from execution of rotational movements increases. Your return on investment in GPP ("general physical preparedness" or broad-based fitness) will be high.

Pull put your favorite CrossFit workout of the day. Or fire up your Internet connection and see what is up at headquarters. You

can also use dice like I do with my clients. Each roll represents one of "the girls." For beginners, we do these workouts modified and scaled back (what I like to refer to as "*Men's Journal* style"). You can follow the three-days-on, one-day-off workout schedule that CrossFit.com uses, but there's nothing magical about that particular scheme. You can get equally good results from a fiveon, two-off schedule, or from one day on and one day off. It's important not to get injured by an irrational exuberance for loading or to chase a good time. Establish consistency and build strong technique in the fundamental movements first.

Step 3: Perform rotation-specific movements

Before your workout, practice these drills with light dumbbells.

Lunge and twist

This basic drill can be implemented with almost any population. Keep the hips stationary and turn the torso toward the side. "Take a picture" and hold it for a moment. Go forward and backward for five to ten paces. Only light loading is required.

Online Video	
http://media.crossfit.com/cf-video/RutJuly07_Lunge_Twist.wmv	
http://media.crossfit.com/cf-video/RutJuly07_Lunge_Twist.mov	

Reverse lunge tilt and twist

The reverse lunge tilt and twist is a multi-planar movement using two 10-pound dumbbells. The frontal, sagittal, and transverse planes are all active during this movement. Step back with the right leg. With a light dumbbell in the left hand, reach up and tilt to the right, looking over the right shoulder slightly. Make sure the hips are square to the front, and do not overreach. (People who have hypermobility in their lower back do not need loading for this particular movement.) Switch hands and reverse the direction of the movement. Try three to five reps per side for this exercise.



Overhead extension anterior reach

Stand on the left leg with a light dumbbell in the right hand. Reach back overhead with the dumbbell and then reach forward with it toward the ground while balancing on the left leg. You can place

Dumbbell Conditioning for Rotational Strength and Health

...continued

a cone or other object in front of you as a target to touch on the forward part of the movement.



Low to high diagonal reach

Squat with a light- to moderate-weight dumbbell at the floor just outside your right ankle, with both hands holding the dumbbell handle. Then, in a smooth motion, stand and rotate to the left, pulling the bell diagonally up across your body and up over the left shoulder until the arms are fully extended upward and to the left. As you execute the move, your torso and head will rotate along with the bell, and you will pivot on your toes to face to the left. Repeat on the other side. The total number of reps need not exceed five to ten per side in a set.



Saxon side bends

Named for old-school strength athlete Arthur Saxon, this is also a good warm-up drill when performed without load. For the weighted version, use two one- to three-pound dumbbells. Seriously, this is all the weight you or your athletes will need. Press the bells over your head and position the feet at shoulder width. Lean to the left and then return to center and move immediately to the right. This is a dynamic movement in both directions. Keep the chin untucked and the eyes forward. Perform five to ten reps.

Online Video	Saxon Sidebend 🦨
http://media.crossfit.com/cf-video/RutJuly07_Saxon_Sidebend.wmv	`
http://media.crossfit.com/cf-video/RutJuly07_Saxon_Sidebend.mov	

Michael Rutherford (a.k.a. Coach Rut, a.k.a "the Dumbbell Coach") is the owner of <u>CrossFit Kansas City/Boot Camp Fitness</u>. He has over a quartercentury 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. 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 <u>Dumbbell Moves</u>.



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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



The Grinder

CrossFit FRAGO #12, "PALMER"

CFHQ Santa Cruz, CA USA

01 JULY 07

OPS 13 FRAGO 12 TO OPORD 01 - OP GRINDER

Ref: A. OPORD 01 01 Jul 06

Task Organization: Annex A

- 1. SITUATION. No Change.
- 2. <u>MISSION</u>

"PALMER": Three rounds, one minute of each exercise per round: double-unders, wall ball, sumo deadlift high pull, push press, and box jump.

- 3. EXECUTION
- a. Concept of Operations.
 - (1) <u>Intent.</u> Complete the exercises, as quickly as possible, in a safe manner. This is a five-person-team, "taskspecific" 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 five as possible. Each team will require a skipping rope or sash cord for double-unders, a 20-lb medicine ball or austere medicine ball for wall ball, a .50-cal ammo can for sumo deadlift high pulls, a 25mm ammo can for push presses, and two Stryker tires for box jumps. All teams will start at the same time. Each soldier will start the workout at a specific exercise station. The soldiers will rotate to the next station after a minute of exercising, completing as many reps of the exercise as possible. The clock does not stop between exercises. After each five-minute round, at the completion of all five stations, there is a one-minute break. One point is given for each rep of each exercise. Spotting will not be permitted at any time during the workout.

CrossFit FRAGO #12, "PALMER" ...continued

- (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 rep completed of the exercises; for example, one point is given for each double-under, wall-ball shot, sumo deadlift high pull, push press, and box jump. The total reps from each round are added together. 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.
 - (5) Follow-on Tasks. The next workout will require two .50cal ammo cans, four 6-foot pickets, and one 25-mm ammo can per four-person team.

CrossFit FRAGO #12, "PALMER" ...continued

3. <u>SERVICE SUPPORT</u>

a. Equipment Weights

Ammo Can Nomenclature	Quantity / Size	Туре	Weight	Contents
Cart 25mm APFSDS-T	30 rds	PA125	70 lbs	Sand
Cart cal .50 4B/1T	100 rds	M2A1	50 lbs	Sand
Stryker tire and rim	1	2610-20-000-7697	approx 350 lbs	NA

- b. <u>Equipment Requirements.</u> Each five-person team will require a skipping rope, a medicine ball, a .50-cal ammo can, a 25-mm ammo can, and two Stryker tires (which will be stacked).
- c. <u>Time and Repetition Recording.</u> One stopwatch for all teams and a method of recording each soldier's reps. The fire-team partner of the soldier conducting the workout keeps score on the score sheet. After the soldier has completed all three rounds of the workout, he switches with his fire-team partner and becomes the score keeper.

4. COMMAND AND SIGNAL

- a. <u>Timer/Score Recorder.</u> Only one timekeeper is required for all teams. All five-man teams begin the workout at the same time. Each soldier conducting the workout has a scorekeeper who follows him throughout the workout, recording his reps at each station. It is recommended that at least one participant start his stopwatch to act as a backup in case the primary timekeeper's stopwatch fails.
- b. <u>Instructor/Coach</u>. 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.

CrossFit FRAGO #12, "PALMER" ...continued

Annexe	es:			
Annex	A	Workout	Diagram	(AOO)
Annex	В	Equipmer	nt	
Annex	С	Exercise	es	
Annex	D	Implemer	ntation	Photograph

Annex A Workout Diagram (AOO)



Annex B Equipment



















Annex D Implementation Photograph

A recent 80-person implementation of "Palmer"