





Robert Ord

The operational requirements of the United States Special Operations Command (SOCOM) continue to demand an increasing number of highly motivated, skilled, educated, and trained military warriors to backfill and replace members of Special Operations Forces (SOF) on the front lines. SOCOM lays out its fundamental guiding principles for personnel in three "SOF Truths": 1) Humans are more important than hardware, 2) Special Operations Forces cannot be mass-produced, and 3) Quality is better than quantity. Thus developing the right force is a result of selecting the right personnel and preparing them with the best training and equipment possible. That is our mission at U.S Tactical too.

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U.S. Tactical is a training center and CrossFit affiliate in Encinitas, California, that acts on SOCOM'S call to duty by reaching out to prospective candidates through our unique Special Warfare/Special Operations Mentor Program. Our mission is to train, motivate, and mentor potential recruits before they enter into one of the U.S. military's elite SOF training pipelines. To accomplish this, we first fully embraced CrossFit by becoming an affiliate and opening our Encinitas CrossFit Center. Then we fused much of the Navy SEAL physical training regimen with CrossFit principles to make a wickedly challenging program that builds the foundation for success at SOF training schools while broadening individuals' confidence in their capabilities. For U.S. Tactical, our mission success is directly linked to the passing rates of those who undergo our rigorous pre-SOF training.

The importance of physical preparation

While there is often friendly and spirited debate among SOF warriors from different branches of the military about whose training is the toughest, what's not in question is the fact that if you arrive at the front door of any one of them unprepared, you won't be staying long. An introductory Physical Screening Test (PST) is administered to all prospective students at BUD/S (Basic Underwater Demolition/SEAL Training School) as a general assessment of the baseline fitness necessary to enter training.

Requirements and minimum scores for the SEAL PST are as follows:

500-yard swim (sidestroke and/or breaststroke) 12:30
Rest 10 minutes
Max push-ups in 2 minutes
Rest 2 minutes
Max sit-ups in 2 minutes
Rest 2 minutes
Max pull-ups
Rest 10 minutes
1.5-mile run in boots and pants

A recent study at BUD/S showed that swim and run scores from the introductory Physical Screening Test (PST) directly correlated with overall passing rates. The statistics in table I were compiled from previous BUD/S classes and show the passing rates of students with various PST scores.

PST Run Time	% Graduated
Greater than 11:05	8.9%
10:13 - 11:05	18.7%
9:52 - 10:12	27.9%
Less than 9:51	41.5%

PST Swim Time	% Graduated
Greater than 10:52	10.2%
10:12 - 10:52	19.5%
9:43 – 10:11	25.3%
9:02 - 9:42	33.6%
Less than 9:01	43.3%

Run less than 9:33 and	
swim less than 10:11	55.2%
Run less than 9:51 and	
swim less than 10:11	48.6%
swim greater than 10:11	29.7%
Run 9:52 - 10:12 and	
swim less than 9:57	37.8%
swim greater than 9:57	18.2%
Run 10:13 – 11:05 and	
swim less than 9:57	29%
swim 9:43 – 10:52	18.1%
swim greater than 10:52	9%

Table I. BUD/S graduation rates, by introductory PST score.

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From the numbers, it's obvious that physical conditioning is an important factor in what it takes to succeed at SOF training. Interestingly though, these numbers also show that, at best, physical preparation is only half the story. To be successful in any SOF training program, and to be a good operator in the field, there is a less tangible element that must be present, commonly called "heart" or "spirit." This is what differentiates true warriors from posers.

The Samurai called this element *kokoro*, loosely defined as "indomitable spirit," or the refusal to accept defeat. It represents the inner warrior, forged through intense training under masterful instruction. U.S. Tactical's mission is to build *kokoro* in pre-SOF candidates by providing elements of the Navy SEAL training regimen fused with the world-class strength and conditioning of CrossFit. The result is an extremely rewarding and challenging training program that builds fitness across all competencies while broadening candidates' confidence and maturity.

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U.S. Tactical pre-SOF training overview

U.S. Tactical pre-SOF trainers are more coach and mentor than "boot camp instructor." Our goal is to help individuals to develop all the qualities of the SOF warrior. When they experience the full force of the elite training pipelines, under stressful conditions and imperious instructors, they will have experience and tools to overcome the challenges they are to face if accepted into the pipeline. Our pre-SOF training continuum is composed of two main blocks: Selection and Preparation.

Selection

The first phase of the Selection block consists of indoctrination into the primary elements of the training to come, specifically difficult CrossFit workouts and long runs and swims, as well as some of the preliminary elements of *kokoro*. For some, the indoctrination phase is a shock, while for those who have been doing CrossFit, it often means simply shifting training focus somewhat.

In the second phase of Selection, the main objective is to reveal the warrior within by pushing training to the limit and requiring more out of trainees than they ever thought they were capable of. This requires more than just difficult workouts, although these are in no short supply. It also includes memorization and strict adherence to the Navy SEAL warrior ethos, as well as homework assignments that develop an understanding of some of history's







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greatest warriors. Trainees are evaluated at all times and are pushed hard to reach deep within. Regardless of athletic or academic ability, by regulating volume and scaling in the physical training while adding mental challenges and requiring an in-depth understanding of what it means to be a warrior through study and introspection, candidates are transformed in body, mind, and spirit.

At the conclusion of the second phase of Selection, depending on how a trainee has done, he may face a panel of BTDT (been there done that) professionals who evaluate his training record and interview the candidate. Following a favorable review, the candidate can continue on to the next segment of our training. Candidates who do not get the go-ahead may be invited to repeat Selection or asked to leave. (More specific information on this will appear in later *CrossFit Journal* articles.)

Preparation

In the first phase of Preparation the tempo that was held during Selection is increased by adding the element of focused in-water training, in both the pool and the ocean. Our CrossFit workouts in this phase frequently incorporate swimming, and long ocean swims with fins are a norm. Trainees master the combat swimmer sidestroke and are introduced to elements of hydrographic reconnaissance, tides and currents, and breath-holding.

In the second phase of Preparation, the time and energy that went to the water are taken to the land. Specialized training in this phase focuses primarily on developing competency in running short and long distances fast, although there is also time devoted to humping with rucksacks and land navigation. As with all phases of training, varied, high-intensity CrossFit workouts still figure into our programming on a regular basis.

The stamp of approval

At U.S. Tactical, a candidate who makes it through Pre-SOF Selection to Preparation, *probably* has what it takes to make it through BUD/S or one of the other SOF pipelines. Candidates who complete Preparation receive the U.S. Tactical "stamp of approval." Our first two trainees both received the stamp of approval and are now pursuing their dream to become SEALs. These pioneers of our pre-SOF training program contributed significantly (and often unwillingly) to the development of what is now the most comprehensive pre-SOF training available.

In the case of these two trainees, both arrived to the program in decent shape as a result of a long history of exposure to CrossFit and Olympic weightlifting. However, by every measure, both candidates increased their output significantly by dropping considerable time on both the swim and the run portions of the PST and making marked improvement in their strength and stamina in all other areas, including push-ups, sit-ups, and pull-ups. More important than PST scores, however, was their discovery of the *kokoro* required to meet the challenges of the program, which will continue to mature as they develop as individuals and warriors.

The way forward

It is clear to U.S. Tactical that there is a growing need for a comprehensive pre-SOF training program at many CrossFit facilities across the U.S. and Canada. U.S. Tactical is committed to the success of these individuals and to helping the CrossFit community send these men to their fate prepared. Harbor City CrossFit in Melbourne, Florida, is slated to be the first official East Coast training location for U.S. Tactical Pre-SOF program. In future issues of the *CrossFit Journal*, we will provide information on the specifics of our training.

Fast as the wind, quiet as the forest, aggressive as fire, and immovable as a mountain.

-- Samuraí battle banner

Robert Ord is the Director of Training at the U.S. Tactical CrossFitTraining Center in Encinitas, California, where he oversees all CrossFit training at the center as well as the online training and mentoring provided by NavySEALs.com. Initially trained by the Navy as a corpsman and deep sea diver, Rob chose the path of Special Operations by volunteering for duty with SEAL Delivery Vehicle Team One, where he worked as a diving medical technician in numerous platoons and other capacities. He is still a member of the Naval Reserves at the Naval Special Warfare Command but has also had the opportunity to work with the Special Boat Teams, Explosive Ordinance Disposal Detachments, Marine Corps Units, and Deep Sea Diving Commands. He worked as a consultant and contractor with the Navy in its efforts to find and effectively prepare future SEALs, Special Warfare combat crewmen, explosive ordnance disposal technicians, and Navy divers before devoting his full time to the U.S. Tactical CrossFit Training Center.

Efficient Running

The Pose Method

Michael Collins

I have been a swimming coach for over twenty years, and in the swimming world most people understand the importance of technique for becoming a great swimmer. However, in the running world the main focus is on training harder, longer, or faster, and people seem to think you just "naturally" learn to run correctly by doing a lot of it.

Most of the running books I have checked out spend a lot more time on the training of running instead of the technique of running. Even the books that have technique sections don't teach it in a simple-to-follow progressive pattern. Most think of running as more of a conditioning sport than a technique sport like golf or tennis. It is more aerobically based than those two sports, but running with poor form will increase your heart rate and keep you slow, regardless of how much running you do, as well as potentially cause injuries. Technique greatly affects the heart rate and efficiency. Learning to run with efficient technique is a critical skill to economy running.

Recently there has been a lot of talk about the Pose Method of running, but many don't know what it means or what it is about. This article will answer some of those questions.

What is the Pose Method?

The Pose Method is a system of human movement and teaching based on determining the key pose in a movement complex and then working with the laws of nature instead of against them. This is achieved by using gravity as the primary force for movement instead of muscular energy.

The ability of certain poses to integrate the whole chain of preceding and subsequent movements into one whole, wasting no energy or inconsequential movements, lays the foundation for the Pose Method. Pose is not just for running, even though that's the most popularly known application. It's a unifying theory of movement, and models have been created for swimming, cycling, rowing, skating, and track and field events as well.

Is the Pose Method new?

The Pose Method was first published by Dr. Nicholas Romanov in 1981, and it is in a continual state of refinement both for coaches and athletes as adoption and understanding increase.

The ideas used in the Pose Method have been around a long time. Some of the foundational beliefs of the Pose Method come from famous thinkers of the past who were interested in understanding and articulating the principles of movement, including Leonardo da Vinci, Nikolai Bernstein, and Graham Brown, who in 1912 offered the following description of the relationships among moving bodies, gravity, and work:

> "It seems to me that the act of progression itself—whether it be by flight through the air or by such movements as running over surface of the ground—consists essentially in a movement in which the center of gravity of the body is allowed to fall forwards and downwards under the action of gravity, and in which the momentum thus gained is used forward, so that from one point in the cycle to the corresponding point in the next, no work is done (theoretically), but the mass of the individual is, in effect, moved horizontally through the environment."

However, the Pose Method itself is new in that it is the first technique running model that directly takes into consideration the laws of physics, specifically gravity and economy of movement, for understanding how to run efficiently, using the least amount of muscular effort possible.

Is the Pose Method different?

No and yes. It depends. There are runners out there who run beautifully who have never heard of the Pose Method. Either "naturally" or through the help of a coach, they have found the way to run fast using the earth's natural forces for assistance instead of trying to overcome them.

The Pose Method is different from other approaches to running technique in that it is a systematic pattern of drills designed to teach the body to be in the right space, with the right timing, and to use the laws of nature to help with the movement. This kind of progressive and organic method has long been missing from the running world.

I often compare the Pose Method of running to Total Immersion swimming. Total Immersion doesn't teach radically different swimming mechanics than other modern technique coaches, but it does teach swimming in a consistent, easily understood progression of drills. It also uses video analysis as a critical factor in the learning process, which is a strong component of the Pose Method as well. I believe it is possible to learn and improve more in a one-hour video analysis lesson or in a one- or two-day clinic than in years of training with incorrect technique.

Efficient Running

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Key principles

Pose is the best model out there of how to run efficiently. The principles are easy to understand, yet very detailed, and are based on sound principles of correct body mechanics combined with using the laws of nature to assist with movement. The technique promotes faster running with less injury potential.

"Strike a pose"



Holding the correct running posture will allow you to maintain better speed with less effort. Many runners lean forward too much by bending at the hips, which actually pushes them back behind the general center of mass. The hips should be pulled forward under the chest with the head staying in alignment as well (the head should not be forward of the body).

Use gravity to "fall forward"

If you just run in place by popping your heels up quickly you will notice that you start to move forward with just a tiny lean forward. You don't have to be pushing out the back with your legs to move forward. If anything, the motion of pushing back is throwing your energy in the opposite direction of where you want to travel. Instead, try to redirect your foot forward after contact by allowing the ground reaction and muscle elasticity to pop your foot up off the ground after landing. This can only happen if you are landing under your General Center of Mass (GCM), not with your foot out in front of you. This will feel like you are running with a very compact, small step style, but in fact, your actual distance per stride may actually increase because your general center of mass will be traveling at a faster pace if you aren't slowing yourself down with each step by landing too far in front of the body.

Pull; don't push

Try to pull your foot straight up off the ground as your GCM passes over it instead of trying to push-off with the back foot to propel you forward. This keeps the form compact and quicker, while less prone to fatigue or injury because the full range of the limbs is not being used. The knees should never fully straighten at any time while running. A mistake many make is to extend the leg out the back to get a full push-off, but since the general center of mass has already passed by this is a wasted motion.

Use a small and compact arm carriage

Your elbows should be bent slightly more than 90 degrees and should pump back quickly to match the legs' tempo. Arms should

not swing across the body much from side to side, and they should not be carried too low or the knees and heels will also tend to stay very low. However, while a high arm carriage is encouraged, it should not be achieved by keeping the shoulders tense. Relax the shoulders, but run with the elbows bent and arms swinging quickly and held compact to match and assist with the cadence of the legs.

Fast feet

Good runners maintain a minimum of 90 and up to as much as 100+ cycles per minute (180 to 200 steps), so they can use the benefit of ground reaction forces and muscle elasticity to keep them moving with less effort and more rhythm. Runners who don't maintain this kind of tempo absorb more shock through their body and must use much more muscle power to keep them moving forward.

This frequency rate is very similar to cycling cadence. Try to imagine spinning as if you are in the small chain ring on a bike to feel the light effort with rhythmic quickness.



A great tool to help you learn to maintain a 90+ cycle cadence is a device called the Tempo Trainer, which can be set to beep at any cadence desired to help you stay on track. The number on the unit is based on a percentage of a second, so when it is set at 1.0 it beeps once per second or a 60 cadence. 0.39 Running should be done at 90+ which is .67 on the unit (beeping every three-

quarters of a second). If the unit was set to .60 it would beep 100 times per minute.

Learning to pose

To really learn how to do the Pose Method of running, it is highly recommended to attend a clinic or take a few private lessons from a certified coach who will videotape you running and take you through a progression of drills to teach your muscles to fire in the right sequence and develop muscle memory and timing. For a list of clinics, coaches and a more complete description of the running technique, visit www.posetech.com.



Michael Collins is the first level-4 certified Pose Method Coach and also trains and certifies other coaches in the Pose Method. He owns Multisports Orange County in California and is head coach for Orange County's Nova Masters swimming program. He can be reached at mcollins@multisportsoc.com or 949-338-6682.

The Basics of Pose Running Techniques

Brian MacKenzie

What is the definition of good running technique? There isn't one. But why? These are questions that Pose running's founder Dr. Nicolas Romanov has asked since 1979 and that I've been asking, well, since "shin splints" entered my personal lexicon. So what is good running style then?

There are laws that govern us all and there is no changing the way gravity affects us. In every sport the elite all have some things in common: they use gravity to their advantage; they are compact in their movements; and everything is done with almost an effortless approach.

How do elite athletes run? If you were stripped of your shoes and asked to run barefoot on the road, would you run the same way as you did with shoes? Why not? Because unless you already run Pose-style, or like Haile Gebrselassie or Michael Johnson, you probably run with your foot landing in a manner that quite destructively sends shock waves up your legs into the ankle, knee, and hip joints. In most cases, your foot will land in front of you (photo 1). Think about this for a second. If a car were traveling down the street would you stick something in front of it to speed it up? When an object is in motion, if something lands in front of its center of mass, it will either slow down or stop quite harshly.

The human foot is designed with enough padding on the ball of the foot for the Tarahumara Indians, certain indigenous peoples of Africa, and our ancestors to get around without Nike Shox. It is not designed for the heel to strike the ground first and to roll through to the toes. Take off your shoes and jump up and down barefoot on your heels. Do it! I dare you! Wait, no don't, you didn't sign a waiver! What you should do instead is to jump from and land on the balls of your feet as if you are jump roping. Then give it a whirl with those heels, or even from "mid-foot." Doesn't work so well, huh? This brings up another point. If you were to do a set of twenty jumping squats or a set of twenty jump rope jumps, which would be a more efficient movement for getting your feet off the ground? Obviously, the jump rope hops require less muscle activation, less energy, and less effort. In part, this reflects the difference between muscle contraction (jumping squats) and muscle elasticity (jumping rope). That makes the difference between finishing a marathon ineffectively and finishing a marathon effectively. One will have a lot of pain associated with it (for various reasons I will talk about in another article), and the other will have much less.

We like to think of running—or other movement—happening in three separate phases: the pose, the fall, and the pull. The pose is the point at which your foot passes under your center of mass and you make the shape of the number 4 with your legs and look great (photo 2). The fall happens when you let go, use gravity to your advantage, and just fall. You can see the slight forward lean in both pictures. The pull, where the supporting foot is pulled, instead of pushed, from the ground and movement continues. You can see this happening in photo 3, where the rear leg is still bent but coming off the ground. You can also see how neither foot is in contact with the ground at this point. If you are not in contact with the ground, you cannot get hurt!

As a 180-pound man whose background is in power and strength sports, I am by definition not a runner. Now, though, some would beg to differ as I have completed several runs ranging in length from 5 kilometers to 101 miles. There is a reason that, at 180 pounds, I am faster than most men and women 30 pounds lighter than I and why I have the ability to run for 100 miles at a time. It started by changing the way I ran. I have worked at it since 2001, and I have trained others at it for more than three years. I am by no means fast but I sure as hell am more efficient than most. Learning how to run properly and train properly (and safely) is why I can do this.



Brian MacKenzie is an expert in strength training for endurance athletes as well as a coach for Multisports Orange County. He currently holds a double certification through the International Sports Sciences Association (ISSA, CFT, and SSC) and is a level-2 certified POSE running coach. In addition to owning CrossFit Newport Beach/Genetic Potential, Brian founded and operates one of the only internship programs for professional trainers in California.

Photo I

Photo 2

Photo 3

Intro to the Pose Method for Distance Running

(Video Article)

Mike Collins









In a companion piece to the articles by Collins and MacKenzie in this issue, triathlete and multisports coach Michael Collins explains how to work with, rather than against, the natural forces at play in nonsprint running. Gravity, ground reaction, muscle elasticity, muscle contraction, torque, and momentum are the key factors. However, the technique of many, if not most, runners is such that they are always fighting these elements rather than harnessing them to their advantage.

The Pose method for running is all about understanding the biomechanics and physics involved in maximizing efficiency (and minimizing impact on the body) to enable you to run farther faster. Once you understand and can harness the three pieces of the running movement—the pose (or posture), fall, and pull—running becomes an entirely different beast.









Online Video http://media.crossfit.com/cf-video/CrossFitJournal_MikePoseRunningIntro.wmv http://media.crossfit.com/cf-video/CrossFitJournal_MikePoseRunningIntro.mov **Michael Collins** is the first level-4 certified Pose method coach and also trains and certifies other coaches in the Pose method. He owns Multisports Orange County in California and is head coach for Orange County's Nova Masters swimming program. He can be reached at mcollins@multisportsoc.com or 949-338-6682.

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Video Article (14:44)

Why a 10K WOD?

Tony Leyland

I had planned to follow on from my November *CrossFit Journal* article on spine mechanics for lifters by discussing injury potential due to repetitive loading. In the November article I talked about the dangers of exceeding the shear strength of the spine with poor lifting form. However, injuries often occur in fitness programs due to low-force cyclic loading rather than peak loading. Then, in October, something happened on CrossFit.com that provided the perfect context for my points. On October 16, 2007, the Workout of the Day (WOD) was "Run 10K." The comments contained a few of the usual complaints from folks who dislike running, but nothing unusual for this WOD. Just three days later, on October 19, the WOD was "Run 10K."!

The first five posts to Comments will give you an indication of the general response:

- I. Huh? Really? 3,2,1,....
- 2. Again?
- 3. Again...seriously? Is there a methodology to this? Is this a mistake?
- 4. You'd think it was April 1st.
- 5. Is it Groundhog Day?

Many who posted comments were surprised, as the posts above indicate, and there were a few more complaints than usual, but this post from RoyG caught my interest.

How does a 10k run fit in with the CrossFit philosophy?

Quotes from the foundations pdf:

"Well, at CrossFit we work exclusively with ... shorter high intensity cardiovascular sessions."

"There is a near universal misconception that long distance athletes are fitter than their short distance counterparts. The triathlete, cyclist, and marathoner are often regarded as among the fittest athletes on earth. Nothing could be farther from the truth. The endurance athlete has trained long past any cardiovascular health benefit..."

Isn't 10K a bit too long? I would love to hear from someone regarding the methodology around the frequency of these different WODs. Is it just completely random, or what?

I think this post asks some really good questions. So this month I will answer them to the best of my ability, which also leads right into my original thoughts on tissue loading.

So why should you run 10K?

If you have adopted the CrossFit philosophy, I imagine you would agree that covering considerable distances is a functional movement. We evolved tracking animals, gathering food, migrating with the seasons, etc., so covering distances like 10K are part of our genetic make-up.

Regarding RoyG's question about randomness, I addressed that in my July *CFJ* article "The Principles of Physiologic Conditioning," where I stated that the incredible variety of CrossFit programming is sometimes described as "random," but of course it isn't literally randomly generated. With a truly random program you could theoretically get three CrossFit Totals in a row, or three 10K runs in a row. I argue that the variety in CrossFit helps optimize the overload experienced by the body and forces better adaptation. And as CrossFit is designed to force adaptation in all ten fitness components (physical skills), endurance is fair game.

But the question about whether 10K is too long from the point of view of developing efficient cardiovascular system is a good one. The benefits of running 10K and other distances is well explained by Lon Kilgore in "The Paradox of the Aerobic Fitness Prescription" (*CrossFit Journal* issue 52). He explains that long slow distance (LSD, defined as 60-120 minutes) running at approximately 70 percent of your running VO₂ max does not improve either your cardiovascular efficiency or your running VO₂ max. From a physiological point of view, all it results in is "improvement in stores of oxidative energy substrates and associated enzymes; the athlete can run longer but not faster." But that in itself is not a bad goal, of course—to be able to run longer. And certainly endurance in the muscle groups used in running is improved as well. Of course, you shouldn't train *just* LSD (as so many supposedly "fit" folks do), but that doesn't mean it is something to be avoided entirely.

One of the reasons CrossFit is so safe is that it doesn't specialize, and, although you may be working hard again the day immediately after a brutal workout, you aren't doing the same thing day after day.

But there is another good reason to occasionally cover long distances and that reason is a mechanical one. In last month's article about spine mechanics and the potential dangers of lifting with a flexed (rounded) back, I presented peak spinal compression and shear values during "good" and "bad" deadlifts. If a tissue's tensile, compressive, or shear strength is exceeded, that tissue will rupture. Figure I shows an approximate "tissue tolerance" graph.

Why a 10K WOD?

Last month I looked primarily at acute injury due to poor form with a heavy load at just one or a few reps (the top left area of the graph). But it is also true that tissues can become damaged due to low forces if those forces are applied repeatedly and without adequate recovery time. Many athletes, especially specialists in certain high-rep, high-distance, long-duration activities, sustain chronic injuries caused by repetitive loading of tissues at low forces (the bottom right area of the graph). These are often runners (recreational or competitive), who commonly experience injury to their knees, iliotibial bands, ankles, etc.; it certainly isn't unusual for swimmers, either, to develop tendonitis and/or small tears in their rotator cuff muscle tendons.



Figure 1: Tissue tolerance and the injury threshold

A tissue's response to mechanical loading is complex, but think of breaking a piece of metal by bending it back and forth a number of times. You don't snap it in a single high-force effort but by working it repeatedly. This is not exactly what happens in a human tendon exposed to repeated mechanical stress, but it is pretty close. When repeatedly loaded, the tendon or ligament never quite recovers from the first loading; then it is loaded a second time and recovers slightly less again; then is loaded again and recovers even less, and so on. This lack of full recovery and repair of the tissue ultimately lowers its ability to withstand forces and can eventually cause failure at a much lower load than that required to cause failure in a single application.

Running injuries are the most common example of this repetitive stress failure. Each footstrike is a collision with the ground as your body moves down, hits the ground and moves back upward and forward. The number of footstrikes you perform during a 10K run depends on your stride length, but it's probably in the range of approximately 6,000 to 7,000 (around 1,000 per mile). The peak contact force will depend on body weight and running style (see the articles by Collins and MacKenzie in this issue), but for most athletes it is around three times body weight—not an inconsiderable figure even for the lightweight among us. Another factor is the high repeat rate of these impacts—about 180 times per minute for the average runner. The higher the rate, the less time between impacts for the tissue to rebound and recover. So, simply put, thousands upon thousands of footstrikes, each one applying hundreds of pounds of force, executed at a high frequency, take their toll.

I am making the argument that running I0K is tough on your body. In addition to the potential of mechanical injury to the joints, tendons, muscles, and ligaments, the trauma associated with footstrike is the major cause of hemolysis after running. Hemolysis is the breaking open of red blood cells and the release of hemoglobin into the surrounding fluid. Studies have shown that cycling at 75 percent of VO₂ max does not cause the same amount of hemolysis as running at that intensity. The same would be true of rowing, an activity that quite a few CrossFitters seem to post as their substitute for long runs.

So what is my point? Am I saying that you should not run 10K? No. Although CrossFit can effectively build a high level of aerobic running fitness and endurance via interval training and other highintensity anaerobic activity, these do not simulate the mechanical loading of a long run. A split jerk with a heavy load results in very high ground contact forces, but how many would you do per workout? Even in a program based in part on the necessity of variety, the principle of specificity cannot be ignored—and one of the basic tenets of CrossFit is to prepare the athlete for anything life can throw at him or her. The running, box jumps, push jerks, and anything else requiring footstrikes in your general strength and conditioning will certainly help your tissues develop tolerance, but no other CrossFit workout would require 6,000 to 7,000 footstrikes. It's a useful part of the programming, from time to time.

So what about the mechanical injury potential and hemolysis I have described? The point is that with all derangements of our homeostasis there is always an optimum level of stress that the tissue can recover from without injury or sickness. As it recovers, the body is forced to adapt and become stronger and better able to withstand the same physical insult the next time. The metal bending example shouldn't make us forget that human tissue, unlike cold hard metal, can repair itself if given appropriate rest. One of the reasons CrossFit is so safe is that it doesn't specialize, and, although you may be working hard again the day immediately after a brutal workout, you aren't doing the same thing day after day. So although your legs may take a pounding (and the impact and vibration will reach the back as well!), your upper body and shoulders are having a recovery day during that 10K run. This is one of the extremely fascinating things about CrossFit: how it can make you work so hard on a 3:1 work:rest cycle of days and be a

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Why a IOK WOD?

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very safe, even protective, program (with appropriate scaling for individual athletes, of course).

The graph in Figure 2 shows another relationship between loading and injury. The sedentary in our society risk injury because their tissues are so deconditioned they are hardly able to withstand even moderate loading (left of graph) and the specialized athlete is at risk due to excessive repetition (right of graph). CrossFit makes you go hard and that always carries some risk; but intensity is what gets results. The key is to achieve the high work and power outputs while allowing our joints, tendons, muscles and ligaments to recover sufficiently enough to avoid injury. I believe CrossFit does that very well. In summary, if you just do short interval work to improve VO_2 max and then have to run (or even hike with heavy gear) quite a distance, your body will hate the pounding it takes. Just as your body adapts to strength training and progressive overload, it also adapts to the mechanical stress of thousands of foot strikes. Trust me: you may be able to easily handle a 200-pound push jerk and, yes, the contact force will be much higher than of any individual footstrike when running, but if you duck all the runs and then have to cover a lot of distance, it'll hurt big time and may even injure you. That's a big chink in your fitness armor.



Figure 2: Optimal loading and activity level versus risk of injury

So maybe I have convinced you that covering a reasonable distance is a good WOD that has physiological and mechanical benefits. But why twice in four days, as happened in October? Or, maybe we should ask...why *not*? Although not random, CrossFit does intentionally offer a variety of challenges, physical and mental. Variety forces effective adaptation.



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Gi Guard Pass from Brazilian Jiu-Jitsu

Becca Borawski

Last month's article covered the story of world-champion grappler Valerie Worthington. This month, Valerie demonstrates the first of three jiu-jitsu techniques we will be featuring. Valerie has trained extensively in both gi (wearing the traditional kimono) and nogi grappling techniques and has chosen a few of her favorites to share.

This month's move, the gi guard pass, begins with Valerie in Andy's guard (photos I and 2). Although to the layman it might appear that Andy is at a disadvantage, being on his back, he can actually mount numerous offensive movements from this position. By keeping his legs locked around Valerie, he can control her movements and keep her on the defensive. He also has the ability to set up chokes and arm locks.





Andy will keep the advantage as long as he can maintain his guard, meaning keeping his legs around Valerie. If she is able to pass his guard (escape from the leg wrap), then the tables will be turned and she will be able to achieve half-guard, side mount, or even a full mount. All of these are offensive positions.

Even though Valerie is at the disadvantage in Andy's guard, there are things she can do to maintain good form to assist her. She sits straight up, with good upright posture, and creates a balanced base with her hips and legs underneath her. To keep Andy's offense at bay, she is posting her hands into his solar plexus. With her left hand she grips the sleeve of his right arm, controlling his movement. In her right hand, she grips his gi collar and keeps her arm straight. As when holding weight overhead with an active shoulder and



Gi Guard Pass from Brazilian Jiu-Jitsu

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extended arm, she is using the structure of her arm, locking it straight, so that if he attempts to sit up, or to pull her down, she has a strong defense.

Valerie's objective is to pass Andy's guard and she begins the sequence of movements to achieve this by raising her left knee (photo 3). Raising her left leg first is important, because Valerie is controlling Andy's right arm, so he cannot reach for that leg. If she were to raise her right leg first, he would be able to reach it with his free arm and possibly sweep her.

Once Valerie has her left leg raised and her foot planted on the mat, she can then bring her right leg forward as well. While doing this she maintains her good base, or balance, with her weight and hip position and keeps her center of gravity low (photo 4).

From this position, Valerie stands straight up. Andy maintains a tight guard, so he is hanging heavily off Valerie, hoping she will tire before she can loosen his guard (photos 5 and 6).

To dislodge Andy's guard, Valerie first releases her grip of his gi with her left hand, and then reaches to her side and pushes down on Andy's right leg while attempting to shake him loose (photo 7).









Gi Guard Pass from Brazilian Jiu-Jitsu

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Once Andy's guard loosens, Valerie will allow him to drop to the floor. She takes a lunge position with her left leg behind her and her right foot between Andy's legs. She maintains her grip on Andy's right sleeve (photo 8).

Once Andy is down, Valerie will release her grip with her right hand and slide her hand underneath Andy's left shoulder. She will use her right knee to slice across the inside of Andy's inner right thigh. Andy's thigh will be held down by her shin and she will bring her left leg across, so both her legs are now to Andy's side. Then, she will bring the rest of her right leg through and lower her hips. By bringing her hips down close to Andy's side and keeping her right arm under his left shoulder, Valerie has Andy's movement controlled. She is also controlling his right arm by holding it at the triceps and keeping it trapped by keeping her elbow close to her side. She is pressing her weight into Andy's torso. This position is sometimes referred to as "broken scarf hold" or "Judo side control" (photos 9, 10, and 11).

As the final step in this sequence, Valerie flips her hips over to assume regular side control (photo 12). Her hands remain in the same place, but she is now belly down to the mat. She is putting pressure on Andy with her chest and also keeping her knees close to his body to restrain his movement. Her right knee is close to his hip and her left knee is close to his ear. From this position, Valerie can begin mounting her own offensive strategy.







Valerie Worthington earned her Brazilian jiu-jitsu purple belt from Carlson Gracie and Carlson Gracie, Jr. She currently trains at the New Breed Academy in California. A dedicated member of Petranek Fitness/CrossFit Los Angeles, Valerie was a gold medalist at the 2007 World Grappling Championships in Turkey.

Becca Borawski, CSCS, teaches and trains at Petranek Fitness/CrossFit Los Angeles in S 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.

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The Mental Marksman

Tes Salb

The power of the mind is immeasurable. When allowed, it is capable of driving the body past its perceived limitations and can help create desired physical outcomes. Through training, the mind can become an individual's foremost tool in sports.

To some extent, athletes, business professionals, military personnel, and law enforcement officials all rely on different, specialized strengths, both mentally and physically; however, the training derived in one activity can oftentimes be carried over into others. In a discipline such as marksmanship, the mind is an important tool, and when utilized, can lead the shooter to the podium and beyond.

It is commonly believed that the outcome for skills such as marksmanship and archery are 80 percent mental and 20 percent physical. While these numbers could be argued depending on the situation at hand (combat vs. recreational or competitive target shooting), the mind is virtually limitless in its capabilities. Through mental training or visualization, an athlete can create a thought process that can reduce stress; increase confidence, self-awareness and control; lead to better form and faster improvements; help an individual perform more consistently; and lead to more desirable outcomes and greater success.

My first experience with mental training came at the age of 13 while attending an Olympic development clinic for modern pentathlon, an Olympic sport that puts athletes through a grueling, one-day test in the events of shooting, fencing, swimming, running, and horseback riding. But it was not until five years later while a freshman at the University of Notre Dame that I really experienced the power of mental training. Having put my pentathlon career aside to focus on my studies, I decided to continue shooting as long as possible since I had earned a spot on the U.S. National Shooting Team after winning the Junior Olympic Air Pistol National Championships the year before. Because of my team status, I was required to attend specific matches during the year, such as the Junior Olympics and the World Championship team tryouts.

While I understood the challenges that lay in front of me, my goal for the year was to get as close to maintaining my team status as possible despite not being guaranteed a place to train while earning my degree. After some negotiations and agreements with the university's athletic and security departments, I was granted permission to train with my air pistol three days during the year in a squash court in the athletic center. Understanding that the university was going above and beyond what most would, I was appreciative of its willingness to work with me. However, I also knew that with only three days of hands-on firearms training I would have to rely on visualization exercises to put me where I needed to be before the crucial matches. This not only tested my training skills (quality training over quantity) but brought me back to the mental basis of my preparation.



When I had first been introduced to mental imagery at the age of 13, the idea was very basic. I started learning to relax my entire body while attaining a blank or "quiet" mind. As my mental training advanced, I practiced imagining familiar places and activities while incorporating all of my senses. Eventually I took this to the firing line, where before a competition I would envision myself standing on the firing point, feeling even pressure in my feet, my legs steady, my body solid as if one with the floor. I would inhale deeply, filling my core, and then exhale and allow my entire body to settle into position. My imagery was so real that I could actually feel my finger on the trigger as I took up the first stage before slowly raising my arm up through the target and back down to my aiming point, even though I was actually sitting in a chair behind the firing line. With my eyes closed I could feel them focus on the front sight, seeing the sight picture as if I were truly behind the sights, as my pistol settled in my holding area, steadily squeezing the trigger. The sound of the gun going off would resonate in my ears as

The Mental Marksman

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I maintained focus on the front sight in my mind, imagining the bullet hitting the center of the target.

While mental imagery is a very important and useful tool, it alone can take an individual only so far. Before you can properly utilize mental training, you need strong fundamentals of technique, training, and conditioning for the task at hand. Since my summer had consisted of mostly physical training for shooting, I was able to utilize visualization while continuing to sense what it felt like to fire each round. Every night as I lay in bed I would fire a 40-shot match in my head, rehearsing what it was like to shoot one good shot after another. This allowed me to break down my physical training into the fundamentals of stance, stability, grip, trigger squeeze, sight alignment, and follow through, so that when I turned back to my visualization I was capable of envisioning and sensing the feel for the perfect shot. While my training situation was not ideal, it was enough to allow me to earn a bronze medal at the Junior Olympics and a spot on the 1998 World Championship and World Cup teams.

Over the years my visualization strategies and abilities have advanced, allowing me to add imagery between every round fired. I am now capable of visualizing my shot process with my eyes open without the interruption of conscious thoughts and have even taken this training outside the range. I use it quite often in CrossFit, especially during workouts such as the CrossFit Total, or when I am trying to set a personal record or simply having a bad day. Oftentimes when my body is challenged I find myself becoming anxious or my mind wandering elsewhere. In order to bring myself back to the task at hand I step away from whatever I may be trying to do and go back to my visualization. As I learned in shooting, if I am not 100 percent ready to fire a 10 when I get into position, it is a wasted round. Therefore, in workouts where I am attempting a personal best or know I will struggle, I take a step back and reset my frame of mind through visualization. While I know that my body and will are getting stronger through

the WODs, I still attribute some of my recent improvements to visualization and mental training.

So, before you step up to the firing line, tackle a tough workout, or go for a personal record, take a few moments to get prepared with the following:

- **Relax.** Mental imagery is most effective when the individual is relaxed. Sit down in a chair or lie on the floor and close your eyes. Take a few deep breaths while focusing on releasing the tension from all your muscles, starting with your feet and moving up to the head. Continue breathing regularly and strive for a blank or "quiet" mind where no conscious thoughts enter your head. After you have achieved a quiet mind, start to visualize yourself in your surroundings going through the activity at hand.
- Use Your Senses. Become more self-aware and make the images more vivid by using your senses. Feel yourself going through the motions and feel the texture of your clothing, hear the sounds around you, think positive thoughts, and smell and even taste your surroundings. Create a more realistic sensory image by using all your senses as you continue to imagine executing the activity with perfection.
- **Take Control.** Work to control the images you see. Bring only positive thoughts to your mind; see yourself as you want to perform. This is often easiest to do by visualizing yourself in your body, from an outside perspective, successfully performing the task.
- **Keep It Simple.** When you first start training your mind, keep it simple. Place yourself in an environment that has few distractions. Then practice by visualizing places or activities that are familiar and non-stressful. This will allow you to more fully develop mental skills while increasing confidence and self-awareness.
- Use Your Sense of Feel. Now see yourself in your body performing the movements required. Feel your muscles as you go through the motions. This will solidify the image and make it more realistic and therefore more effective.
- **Practice.** Just like any other movement in sports, mental imagery must be practiced to keep the skill sharp. Ten to 15 minutes a day is enough to keep you and your visualization at the top of your game.

The Mental Marksman

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If I am not 100 percent ready to fire a 10 when I get into position, it is a wasted round.

Mental imagery can be used for almost anything and is a great way to prepare for a big event, or even to get in a little extra training, especially if you're not able to get as much actual physical time on task as you'd like. The mental training process I've outlined here has worked well for me; however, it may not be the most effective for everyone as written. Each individual will have different requirements to make visualization to work for them, not to mention each activity. If you are new to this aspect of training, the process described here this is a good way to get started on your own road to visualization. From there, you can branch out to explore what works best for you, in your activity and circumstances. Different situations require different training, so use your skills and imagination to put together a mental training program that works for you.



Photos by Brian Knight



Tes Salb is the managing editor of the magazine *Shooting Sports USA*, a National RifleAssociation pistol instructor, a level-1 CrossFit trainer, and a former member of the U.S. national shooting team. She is a 2001 graduate of the University of Notre Dame, where she fenced both epee and foil and played trumpet with the Band of the Fighting Irish. She was the lone member of Notre Dame's pistol team, earning a bronze medal in the 2000 NRA Intercollegiate Pistol Championships in air pistol and was a two-time First Team All-American. She was a member of the 1998 U.S.World Championship Shooting Team, has represented the U.S. in five World Cups and placed tenth in the 2000 Olympic Trials. Aside from shooting, she feeds her joy of multisport competition with CrossFit, sprint adventure races, and triathlons, completing her first Ironman in 2006. After taking some time off from the range, she plans to pursue her Olympic shooting aspirations for the 2012 Games.

Supplemental Olympic Lifting for CrossFitters

---- Mike Burgener, with Tony Budding -----

In our series of articles over the past year or so, we've introduced all the basic elements of the snatch and clean and jerk, as well as some of the important assistance and skill-transfer exercises. Starting this month, we'll address strategies for going beyond the basics. We'll make some assumptions about different types of CrossFitters and create programs for them.The goal is not to create competitive weightlifters, but to help CrossFit athletes improve their lifts.

Several times a month we get e-mail questions from CrossFitters who want to improve their Olympic lifting about how to combine such a focus with CrossFit training. Because there are several CrossFitters who come to Mike's Gym on the weekends to train, I deal with this situation there on a regular basis. Most of the CrossFitters who come to Mike's Gym are committed to CrossFit and want to continue to train hard-core CrossFit while they also work on getting better in the Oly lifts.

In this month's article, we'll assume that you have no extended formal training in the lifts, that you regularly follow the WOD (Workout of the Day) from CrossFit.

com, that you've read our other articles and can perform the movements reasonably well with low loads, and that your basic goal is to improve your performance on those workouts that call for heavier cleans, jerks, and snatches. In other words, we're approaching this as if you consider the Oly lifts a chink in your general fitness armor.

The Burgener warm-up is the foundation for learning all the lifts (see our article in the January 2007 issue of the *CrossFit Journal* [#53] for more information and detailed instruction on the Burgener warm-up). It should be done every day with PVC. It can also be done with a light barbell if desired. The Burgener warm-up trains the mind and body to move properly for the Olympic lifts and reinforces the central principle of jumping and landing with the barbell in a vertical plane. The warm-up is performed specifically with the snatch, but the skills transfer directly to the clean and indirectly to the jerk. These movements have to become second nature before your brain will let you move aggressively under a max load. The Burgener warm-up builds the muscle memory that is essential in all heavy lifts.

The Olympic lifts are unique in the degree to which they combine coordination, accuracy, agility, and balance with strength, speed, and power. Many of you will find it easy to perform the snatch with PVC, but will find that your form falls apart when you introduce



even small weights. Your feet may go super wide, or you might start pulling early with your arms. One main cause of this is lack of confidence in the mechanics of the movement. The hips are much stronger than the arms, but the brain doesn't trust that.

Training the movements with PVC and light weight is essential for developing confidence. Weight must be increased in small increments. The many skill transfer exercises we've described are also designed to develop confidence in different aspects of the lifts. For example, the overhead squat builds confidence for the snatch. Knowing you can overhead squat 100kg gives you confidence when you attempt a 70kg snatch. Sometimes, even that is not enough. The snatch balance, for example, adds a dynamic element and drills timing, but it requires no pull, so it's a useful intermediate step between the overhead squat and the snatch.

Incorporating an Oly-specific drill or two several times a week can take your lifts to the next level. Below, we describe a sample strategy for improving your lifts that won't interfere with your standard CrossFit workouts and the three-days-on/one-day-off cycle of the WOD. The athletic skills both demanded and developed by these lifts translates directly into all aspects of a broad, inclusive fitness, and it's well worth it to put some extra time and energy into mastering them.

Supplemental Olympic Lifting for CrossFitters

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Program for weeks I-4

This is a basic program that exposes you to the lifts and associated skill-development exercises. It builds your competency and confidence in the movements. They are the same kinds of drills that all Oly lifters use. Here, we're using them in small doses and mostly in isolation. They are effective by themselves, but they also build on each other to improve all aspects of your lifts.

For the first four weeks, follow the program below, repeating it every eight days for about four weeks. Start with loads well within your comfort zone, and try to increase them gradually each week. Remember, these exercises are prescribed to help you develop confidence in your lifts, not necessarily be a workout in themselves. You're doing the CrossFit WODs for developing the fitness and strength. This is primarily about skill and exposure through repetition. For now, be patient, keep loads manageable, and build a good foundation for later success at the actual lifts. Commitment to the fundamentals always pays off in the end.

In the fifth week, you will switch to the program for weeks 5 through 8 (see next page), which moves from primarily preparatory and supplemental exercises to more actual Olympic lifting.

Day I, weeks I-4

- Burgener warm-up
- Skill transfer exercises for the snatch:
- 3 sets:
 - o 3 overhead squats
 - 3 pressing snatch balances
 - 3 heaving snatch balances
 - 3 snatch balances
 - 3 snate
 CrossFit WOD

Day 2, weeks 1-4

- Burgener warm-up
- CrossFit WOD

Day 3, weeks 1-4

- Burgener warm-up
- 3 front squats + 3 jerks x 5 sets
- CrossFit WOD

<u>Day 4, weeks 1-4</u> Rest day

Day 5, weeks 1-4

- Burgener warm-up
- 3 high-hang snatches + 3 overhead squats x 5 sets
- CrossFit WOD

Day 6, weeks 1-4

- Burgener warm-up
- CrossFit WOD

Day 7, weeks 1-4

- Burgener warm-up
- 3 high-hang cleans + 3 push presses x 5 sets
- CrossFit WOD

Day 8, weeks 1-4 Rest day

Supplemental Olympic Lifting for CrossFitters

...continued

Program for weeks 5-8

In the second four weeks, we incorporate more complex movements. Begin with loads that allow you to perform the entire set properly (full range of motion with correct technique). Each week, seek to increase the weight, but only to the degree that you can keep proper form and range of motion. If you cannot perform the sets properly, don't hesitate to reduce the weight and/or substitute appropriate skill transfer exercises until you can.

Day I, weeks 5-8

- Burgener warm-up
- 5sets:
 - 3-position snatch + I overhead squat (power snatch from the high hang, from mid-thigh, and then from the floor, followed by an overhead squat)
- CrossFit WOD

Day 2, weeks 5-8

- Burgener warm-up
- CrossFit WOD

Day 3, weeks 5-8

- Burgener warm-up
- 6 sets:
 - 3-position clean + push press
 - 3-position clean + push jerk
 - 3-position clean + split jerk

Day 4, weeks 5-8

Rest day

Day 5, weeks 5-8

- Burgener warm-up
- 3 muscle snatches + 3 overhead squats x 3 sets
- 2 snatches from the floor x 5 sets
- CrossFit WOD

Day 6, weeks 5-8

- Burgener warm-up
- CrossFit WOD
- 5 Turkish get-ups per side x 3 sets

Day 7, weeks 5-8

- Burgener warm-up
- 3 power cleans + 3 front squats + 3 jerks x 5 sets
- CrossFit WOD

Day 8, weeks 5-8

Rest day

This is primarily about skill and exposure through repetition. Be patient, keep loads manageable, and build a good foundation. Commitment to the fundamentals always pays off in the end.



Burgener and Budding CrossFit Journal Articles

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Oct 2007 (62):	Fixing Loopy Lifts
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Oct 2006 (50):	Learning the Olympic Lifts: The Stance
Aug 2005 (36):	Digital Coaching with Mike Burgener

Olympic lifting demo videos on CrossFit.com

http://www.crossfit.com/cf-info/excercise.html#Oly

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

Evidence-Based Fitness

(Video Article)

Greg Glassman













In this excerpt from one of his talks at a recent CrossFit certification seminar, founder Greg Glassman discusses the methods and rationale of CrossFit. Fundamentally, what we are about, he explains, is *evidence-based fitness*. Here he breaks that claim down into its constituent parts and explains the logical, scientific basis of the CrossFit system for advancing human performance.

To evaluate any such system, there are three key elements that must be assessed:

- 1) Safety: the program's record for injury avoidance—and prevention.
- 2) Efficacy: its results, or the adaptations it produces.
- 3) Efficiency: how long it takes to achieve those adaptations.

For a fitness program to have meaning, those three elements must be supported by *measurable*, *observable*, *repeatable* data. Moreover, its methods, outputs, and criticisms must be transparent, or available for anyone to see and evaluate. These are the fundamental bases of scientific inquiry and of rational argument and evaluation, and (despite the unempirical, profit-driven nature of so much of the silliness that pervades the fitness industry), they are necessarily the requirements of any fitness program that claims to make you fitter.



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

Jump Rope Basics

Part 2: More Preparation Phase, Plus Double-Under Tips

Buddy Lee

To receive the maximum benefits from your jump rope training sessions, you'll want to follow the four steps of my jump rope system (preparation, intermediate, conditioning, and sports training phases) for safe progression. This will be especially important when we reach the high-intensity jump rope training programs for developing superior fitness and increasing competitive advantages in time and space that I will discuss in future articles.

Once you have completed the first part of the preparation phase, explained in my October 2007 article (which teaches proficiency with proper jump rope form and the two basic jumping techniques, and discusses equipment, environment, and safety), you will enter into the second part of the preparation phase. During this period, the goal is to build from your established jump rope proficiency of 140 to 500 consecutive jumps in safe increments.

Building jump rope endurance to 500 jumps

Remember, jumping is a skilled movement that requires proper timing and coordination of the rope swing to complete each jump. During the second half of the preparation phase, we will work up to 500 jumps in order to develop a basic jump rope capacity. In the beginning, it is best to strive for a set number of jumps instead of time because it will help you to gradually increase your jump rope endurance and coordination while keeping you challenged and motivated every step of the way.

You will continue to work toward the *perfect jump* throughout the preparation phase as you become increasingly proficient at both the basic bounce and the alternate foot step. During this phase do not immediately focus on improving speed. Instead, your focus should be on technique, to establish a solid jump rope foundation for integrating advanced jump techniques and programs later.

Learning how to control the rotary motion of the rope away from the body (centrifugal tendencies) with the gripping of the handles

(centripetal forces) and using the core as a stabilizer transforms into improving gross body equilibrium, coordination, rhythm, and reaction time. Remember, the keys to a perfect jump are correct body mechanics and jumping only high enough to clear the rope for a safe takeoff and landing.

Another key to increasing your jump rope capacity safely is to have an active rest and stretch period between sets. This is important for most people during the early stages of your program because of the new physical fitness demand placed on the muscles. Once you become proficient and conditioned, stretching before and after each session will be sufficient.



Bounce Step

Six-week progressive jump rope endurance program

My six-week program for building jump rope endurance focuses on the two techniques I introduced in my last article, the basic bounce step and the alternate foot step. Remember to stretch your legs and calves between sets as needed.

Week 1: Jump rope conditioning to 25 jumps non-stop

MON	WED	FRI	
Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	
Jump over rope 10 times and then stop	Jump over rope 20 times and then stop	Jump over rope 25 times and then stop	
Reps: 10	Reps: 20	Reps: 25	
Sets: 5	Sets: 5	Sets: 5	
Rest: 60 sec or less	Rest: 60 sec or less	Rest: 60 sec or less	
between sets	between sets	between sets	
Alternate Foot Step	<u>Alternate Foot Step</u>	<u>Alternate Foot Step</u>	
Count right foot only and multiply by 2.	Count right foot only and multiply by 2	Count right foot only and multiply by 2	
Reps: 5	Reps: 10	Reps: 12	
Sets: 5	Sets: 5	Sets: 5	
Rest: 60 seconds	Rest: 60 seconds	Rest: 60 sec or less	
or less	or less		

Week 2: Jump rope conditioning to 50 jumps non-stop

MON	WED	FRI	
NON	WEB		
<u>Basic Bounce Step</u>	Basic Bounce Step	Basic Bounce Step	
Jump over rope 30	Jump over rope 40	Jump over rope 50	
times and then stop	times and then stop	times and then stop	
Reds: 30	Reds: 40	Reds: 50	
Sets: 5	Sets: 5	Sets: 5	
Best: 60 seconds or	Best: 60 seconds or	Best: 60 seconds or	
less detween sets	less detween sets	less between sets	
Altornata East Stap	Altornato East Stop	Altornato Egot Stop	
Alternate Foot Step	Alternate Foot Step	Alternate Foot Step	
Constrainty Const	Constrainty Const		
Count right foot	Count right foot	Count right foot only	
only and multiply	only and multiply	and multiply by 2.	
by 2	by 2		
		Reps: 25	
Reds: 15	Reds: 20	Sets: 5	
Sets: 5	Sets: 5	Rest: 60 seconds or	
Rost: 60 soconds	Rost: 60 soconds	loss	
itest. oo seconds		1033	
or less	or less		

Jump Rope Basics

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Week 3: Jump rope conditioning to 100 jumps non-stop

Week 5: Jump rope conditioning to 350 jumps non-stop

MON	WED	FRI	MON	WED	FRI
Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	Basic Bounce Step
Jump over rope 50 times and then stop	Jump over rope 80 times and then stop	Jump over rope 100 times and then stop	Jump over rope 280 times and then stop	Jump over rope 310 times and then stop	Jump over rope 350 times and then stop
Reps: 50 Sets: 5 Rest: 60 seconds or less between each set	Reps: 80 Sets: 5 Rest: 60 seconds or less between each set	Reps: 100 Sets: 5 Rest: 60 seconds or less between each set	Reps: 280 Sets: 5 Rest: 60 seconds or less between sets	Reps: 310 Sets: 5 Rest: 60 seconds or less between sets	Reps: 350 Sets: 5 Rest: 60 seconds or less between sets
Alternate Foot Step	Alternate Foot Step	Alternate Foot Step	Alternate Foot Step	Alternate Foot Step	Alternate Foot Step
Count right foot only and multiply by 2	Count right foot only and multiply by 2	Count right foot only and multiply by 2	Count right foot only and multiply by 2	Count right foot only and multiply by 2	Count right foot only and multiply by 2 Reps: 175
Reps: 30 Sets: 5 Rest: 60 seconds or less	Reps: 40 Sets: 5 Rest: 60 seconds or less	Sets: 5 Rest: 60 seconds or less	Reps: 140 Sets: 5 Rest: 60 seconds or less	Reps: 155 Sets: 5 Rest: 60 seconds or less	Sets: 5 Rest: 60 seconds or less

Week 4: Jump rope conditioning to 250 jumps non-stop

Week 6: Jump rope conditioning to 500 jumps non-stop

MON	WED	FRI	MON	WED	FRI
Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	Basic Bounce Step	Basic Bounce Step
Jump over rope 150 times and then stop	Jump over rope 200 times and then stop	Jump over rope 250 times and then stop	Jump over rope 400 times and then stop	Jump over rope 450 times and then	Jump over rope 500 times and then stop
Reps: 150 Sets: 5	Reps: 200 Sets: 5	Reps: 250 Sets: 5	Reps: 400 Sets: 5	Reps: 450	Reps: 500 Sets: 5
Rest: 60 seconds or less between sets	Rest: 60 seconds or less between sets	Rest: 60 seconds or less between sets	Rest: 60 seconds or less between each	Sets: 5 Rest: 60 seconds	Rest: 60 seconds or less between each set
Alternate Foot Step	Alternate Foot Step	Alternate Foot Step	set	or less between each set	
Count right foot only and multiply by 2	Count right foot only and multiply by 2	Count right foot only and multiply by 2	Alternate Foot Step Count right foot only and multiply by 2	Alternate Foot Step Count right foot only and multiply	Alternate Foot Step Count right foot only and multiply by 2
Reps: 75 Sets: 5 Rest: 60 seconds or less	Reps: 100 Sets: 5 Rest: 60 seconds or less	Reps: 125 Sets: 5 Rest: 60 seconds or less	Reps: 200 Sets: 5 Rest: 60 seconds or less	by 2 Reps: 225 Sets: 5 Rest: 60 seconds	Reps: 250 Sets: 5 Rest: 60 seconds or less

Jump Rope Basics

...continued

The power jump, a.k.a. the double-under

Because the power jump (or "double-under") is frequently used by CrossFitters, I would like to jump ahead to this higher level of jumping now, to provide some more tips for learning and mastering this technique. As the "double-under" name suggests, the rope passes under the feet twice in one hop. You can learn to perform these consecutively, which is generally called "power jumping."

Power jumping requires the athlete to propel the body upward and lift the feet up to several inches from the surface while making small, fast circular movements with the wrists in order to execute multiple turns of the rope with each jump. This technique develops explosiveness, vertical acceleration, hand and wrist strength, and anaerobic capacity.

The power jump requires good form and is very effective for developing explosiveness. It is perhaps the most important and most difficult to master of the fifteen jump rope techniques that I will cover in this series. The power jump is considered an advanced technique that requires more height than the other jumps, continuous explosive takeoffs, and controlled, safe landings. It requires more time to master than the other jumps and therefore is much easier to attempt after one has mastered the two basic techniques and developed a basic jump rope capacity.

There are different levels of power jumps: the *double* (*basic*) power *jump*, which you will learn here; the *triple power jump*; and the *quadruple* (*advanced*) power *jump*. Also, once you have mastered the other fourteen techniques, they can be incorporated into the *double power jump*.

Procedure

- I. Start with the bounce step stance.
- 2. Execute three bounce step jumps.
- 3. On the fourth jump, bend your knees forward and push off. Jump at least 5 inches from the jumping surface while turning your wrists twice as fast so that the rope passes under your feet twice in one jump.
- 4. Repeat, starting with three single bounce step jumps.
- 5. When you have developed the rhythm and timing for this sequence, perform two consecutive power jumps, then three, then four, and so on.
- 6. Once you are able to perform twenty consecutive power jumps, concentrate on decreasing the height of the jump to two inches off the ground.

When you have mastered this technique, perform the steps in three phases (for an explanation of shadow jumping, see my October 2007 article):

- I. Without the rope.
- 2. While turning the rope to the side of your body.
- 3. While jumping with the rope.

Online Video Double Unders Intro



- Look straight ahead to maintain your balance.
- Keep your body upright and balanced with your weight on the balls of your feet.
- Jump only high enough to clear the rope (one inch off the ground).
- Land lightly on the balls of your feet.
- Keep your elbows close to your sides at a 45-degree angle.
- Never sacrifice good jumping form for speed.

Double-Under Technique Tips

- Keep your head straight and your torso relaxed to maintain balance.
- Your body should be in a straight line when taking off to jump, not bent forward.
- Turn your wrists in small, quick circles.
- Do not hold your breath.
- Do not squeeze the rope handles tightly.
- Use a rope measurement at shoulder level in the beginning and adjust to chest level when you improve.
- The key to power jumping is the quick turning of the wrists, not the height of the jump.



Buddy Lee is a U.S. Olympian in wrestling (1992), the author of the book *Jump Rope Training*, the inventor of the U.S. Olympic Team Official Licensed Jump Ropes, the owner of *Jump Rope Technology*, a two-time < Marine Corps athlete of the year, a motivational speaker, and the world's leading jump rope training expert.

Sign on the Dotted Line

Affiliate Membership Contracts

Andy Petranek

We've all heard the phrase, "Build it, and they will come." Maybe, but will they stick around? If you provide the environment, experience, and expertise, will they become your long-term trainees and your word-of-mouth marketers? Will they enable you to quit your other full-time job and do just this for a living? Will your business provide you the life (and income) that you want and deserve? The answers to these big questions don't really have an answer; they only get answered in time by doing it. However, there is one question that does have an answer which has faced me on a daily basis for the past three years as a CrossFit affiliate business owner: What is the best way to structure my gym memberships to support both the development and growth of students *and* the development and growth of my business?

Until January 2007, I used the system that I think most of the other affiliates currently use: \$x for a drop-in, \$x for a package of 10 to 20 classes, and \$x for unlimited monthly classes. This system wasn't attached to a commitment, or any expiration date, or any real membership structure. And it worked, for the right people—those who were committed, dedicated, disciplined, and really "got it." The responsibility for coming to our classes was entirely on them. If they showed up, they got results, and if they didn't, no problem. It's not like they had a membership, commitment, or contract. If they didn't want to come back, no big deal; just don't. Nothing lost.

This lack of membership structure sounds great. Simply provide exceptional coaching, show people how to get results with a great program (CrossFit), and then deliver the results, and hope people will simply show up—and keep showing up. This system can work...but is it the best we can do? Does putting all the responsibility on students/clients for showing up really, truly support them, or is it simply the easy way, the one that requires the least amount of commitment and work on our part as coaches? Be a great trainer—I love that part—but also be a vehicle for their transformation. That's a different story. If my job begins and ends at the doors of the gym, I would say that my old system is good enough. However, I see my job as having a much greater impact than just squats and lunges. If I'm doing what I do correctly, I literally help people change their lives.

Personally, I do best with structure, across the gamut of disciplines from music and art to sports teams and the military, and even in my Zen training. When I actually have a system that imposes expectations, boundaries, and rules on me, though uncomfortable at first, I'm much better off in the long run. A system supports me and keeps me accountable. The rules actually help me relax. I don't have to be the lead dog, to keep making decisions. When I'm introduced to a system, program, club, or organization with rules and structure, I have to make only *one* decision—to participate, and then, as long as I operate within the confines and rules of the system and keep showing up, I get the results I wanted. And I know I'm not alone; after all, this is what makes the military and police and fire departments function, as well as many of the successful corporations and organizations around the world.

So the question for me was, "How do I create a system like this for my CrossFit business?" After much deliberation, we came up with a new membership structure and introduced it in January 2007. With the help of John Burch, a former champion martial artist and teacher and now my business consultant, we made a bunch of significant changes. The biggest from my point of view was the introduction of the "C word"—contracts. We took all of our forty regular students at the time, sat them down, one at a time, and introduced them to the new system. And despite my fear that I could lose half, or more, of my clientele, every single one of them but one enrolled and signed a contract, most for over a year! In fact, many of them paid up front, *in full*, for an entire year's worth of CrossFit!

Here's what we did.

We created four different membership options, each one associated with a commitment duration and a specific number of times per week of classes: three months at once per week; six months at twice per week; twelve months at three times per week, and eighteen months unlimited. We completely eliminated the option for a "drop-in" (other than for visiting CrossFitters from another affiliate).So, for someone who wanted to train three times per week, for example, the *only* option is to sign a contract for twelve months!

A business contract is a legal document that should be drafted and/or reviewed by a lawyer, but, in general, these are the basic elements that it ought to contain:

- I. Student info
- 2. Membership package and payment specifics
- 3. Credit card / financial info
- 4. EFT request and authorization
- 5. Terms of agreement
- 6. Signatures

One additional item unique to our contract is an explanation of the weekly basis of our class structure. We explain the structure to new students and ask them to sign an acknowledgment. Is works like this: students' commitment to a set number of classes within each week. If they don't attend these classes, the cycle starts over in the next week, and there are no make-ups. In other

Sign on the Dotted Line

...continued

words, if you sign a three-month, once per week contract, you are not purchasing twelve classes to be used anytime during that period; it's one class per week.

When we instituted contracts, we also added services to the program, so students were getting more than just classes in the gym. These include private sessions, nutrition feedback, seminars, guest passes, special events, etc. Additionally, we took responsibility for students' attendance. When they don't show, they get a phone call, and when they do something great, they get a post card.

The result over the past year has been dramatic! We've increased our membership from about 40 paying members per month to over 160, and we've increased our monthly revenue from classes from \$10,000 per month to about \$27,000 per month. We haven't had a down month since the beginning of the year (including the notoriously slow August.)

I can't attribute the results solely to this change. Without my instructors' commitment to being the world's best coaches, none of this would be possible. Becca, Dawn, Cill, Mike, and Jonesy have taken it upon themselves to be the best at what they do. They are absolutely committed to the success of each person who trains here, and it shows. This gives authenticity to the program and to the contract each person signs, and keeps them coming back for more.

So, why the growth? If we use CrossFit's black box approach, does it really matter? We put in x and got out y—and we like the results. Why spend a bunch of time trying to figure out exactly why? I will offer my opinion here, but, remember, it is only that. I offer nothing in terms of proof, or guarantees of repeatability, only our results.

Nothing replaces world-class coaching, the very heart and soul of the CrossFit affiliate community. We do this because we love it and want to be the best at it. Here are some of the possible reasons it has worked so well for us:

- We took full responsibility for the quality of our program and coaching by guaranteeing, in contract form, the results of our students.
- We got over our discomfort of asking people for a commitment.
- We eliminated all the options—and easy outs. If they want to participate, this is the only way.
- We took the daily, weekly, or monthly "buying decision" out of students' hands, freeing them up to focus on training, not paying.
- We created a tighter community; no "transients."
- We followed up our word with action. We have an 85 percent average attendance rate, and non-attendees hear from us weekly.
- We have become better instructors and more invested in students since they are now committed for a minimum of three months. It's much more motivating and rewarding to teach someone that you *know* is coming back.

Of course, nothing replaces world-class coaching, the very heart and soul of the CrossFit affiliate community. We do this because we love it and want to be the best at it. But often that's just not enough to give us the life and living we want. So are contracts the answer? That's like asking an NFL football coach if having LaDainian Tomlinson will get him to the Super Bowl. Could it help? Probably. Does it guarantee anything? Absolutely not (just ask Norv Turner of the Chargers.) Is it the only way? Of course not. There are a lot of factors that go into making a championship team and a successful CrossFit affiliate. Contracts are simply one of the available tools that shouldn't be overlooked.



Andy Petranek is the owner of Petranek Fitness/ CrossFit Los Angeles. He's been in the fitness business for over ten years and has been CrossFitting for almost four. He is a former United States Marine and adventure junkie, having raced at an elite level (sponsored by Red Bull) in three EcoChallenges and hundreds of shorterduration adventure races. He's a snowboarder and whitewater kayaker and loves his newest adventure fatherhood.

Conjecture, Hypothesis, Theory, Law

The Basis of Rational Argument

🧹 🗸 Jeff Glassman 🗸

Last year, Lee Smolin published a book with a most provocative title: The Trouble with Physics: The Rise of String Theory, the Fall of a Science, and What Comes Next. This title promises brimstone for the fire of creationism, and that should sell an extra few thousand copies.

If mathematics is the Queen of Science (borrowing from *Mathematics: Queen and Servant of Science*, a classic by Eric Temple Bell), then physics is the King. It has been the exemplar of science. So, has the revolution begun?

The reviews of *The Trouble with Physics* tell us that Smolin urges not that string theory arises from the decay of physics but instead that string theory is itself symptomatic of something that is wrong *in* physics (a sick distant cousin), not *with* physics (a fatal familial disease). According to the criticism (the most valuable part of reviews), Smolin both spends too much time on string theory and gives it short shrift. Could the latter, though, just be string theorists taking offense, and further evidence of what is wrong in physics?

Two independent and published reviews of *The Trouble* suggest that what Smolin observes in physics is what is also happening in climatology—and, in fact, I argue, it is what is happening in all science, from kindergarten curricula to the Pulitzer Prize. Some people attain the highest ranks in a scientific field without ever gaining an understanding of it in the context of science itself. This is what happened to the masters of cold fusion and anthropogenic (manmade) global warming and to advocates for Piltdown man and creationism. This conclusion rises out of the two reviews of Smolin, which come to his support by ragging on string theory. They do so not from the standpoint of physics, but from the metaphysical, by appealing to the transcending prerequisites of science! One cannot judge physics from within physics. (Gödel would have been pleased.)

Gregg Easterbrook, a science writer and editor at *The New Republic*, The Atlantic Monthly, and Washington Monthly, and a visiting fellow at the Brookings Institution, published his review of Smolin in *Slate* magazine. Over a year ago he wrote,

> The ordering of scientific notions is: conjecture, hypothesis, theory. Pope John Paul II chose his words carefully when in 1996 he called evolution "more than a hypothesis." Yet the very sorts of elite-institution academics who snigger at creationists for revealing their ignorance of scientific terminology by calling evolution "just a theory" nonetheless uniformly say "string theory." Since what they're talking about is strictly a thought experiment (just try proving there are no other dimensions), from now on, "string conjecture," please.

Notwithstanding that the list in the first sentence is missing a key notion, it and the concluding phrase "string conjecture" sparkle

scientifically, regardless of the physics. Easterbrook's review is fairly rich in the stuff of science, including observations, scale, prediction, testing, and laws. Yet he didn't catch that the complete ordering of scientific notions is really conjecture, hypothesis, theory, and law.

Easterbrook's scientific literacy is too wanting for a reader to infer that these flashes of brilliance are his. His limitations are immediately evident from his public conversion from global warming skeptic to alarmist. He reasoned:

> Once global-warming science was too uncertain to form the basis of policy decisions—and this was hardly just the contention of oil executives. "There is no evidence yet" of dangerous climate change, a National Academy of Sciences report said in 1991.A 1992 survey of the American Geophysical Union and the American Meteorological Society found that only 17 percent of members believed there was sufficient grounds to declare an artificial greenhouse effect in progress. In 1993 Thomas Karl, director of the National Climatic Data Center, said there existed "a great range of uncertainty" regarding whether the world is warming. Clearly, the question called for more research.

> That research is now in, and it shows a strong scientific consensus that an artificially warming world is a real phenomenon posing real danger... . [¶] Case closed. (Easterbrook, "Finally Feeling the Heat," New York Times, 24 April 2006.)

The media reverberates, and Easterbrook pumps it by ringing the alarm: "Here's the short version of everything you need to know about global warming. First, the consensus of the scientific community has shifted from skepticism to near-unanimous acceptance of the evidence of an artificial greenhouse effect." (Easterbrook, "Case Closed: The Debate about Global Warming is Over," Brookings Institution Governance Studies, June 2006.

With this bandwagonism, Easterbrook reveals two fatal flaws in his scientific literacy. First, science is never about voting, the popularity of a belief, or even beliefs themselves. Models are never validated by consensus, but by facts satisfying predictions. Second, the case is never closed, even when the model has advanced to the ultimate, a law. Relativity didn't invalidate Newton's Laws; it just required the domain to be tightened. So, where did Easterbrook get his rather profound information about the ranking of models? If he should have credited Smolin, then Smolin, and his authorities, deserve the recognition.

This year, Michael Riordan, Ph.D., an adjunct professor of physics at UC Santa Cruz and a History of Philosophy Lecturer at Stanford, published the second noteworthy review of Smolin for *Physics World* magazine. He, too, uses the scientific vocabulary, including

Conjecture, Hypothesis, Theory, Law

...continued

the terms model, scale, observation, proof, prediction, theory, hypothesis, conjecture, and law. He supports the thesis here inferred to Smolin when he says,

But string theory is not really a "theory" at all—at least not in the strict sense that scientists generally use the term. It is instead a dense, weedy thicket of hypotheses and conjectures badly in need of pruning.

That pruning, however, can come only from observation and experiment, to which string theory (a phrase I will grudgingly continue using) is largely inaccessible (p. I).

Easterbrook gave his example of the importance of scientific model quality when he took academics to task for ridiculing creationist theory while simultaneously labeling the string model as a theory. He also skirted the complementary example: creationists ridicule evolution for being only a theory, but a theory ranks near the epitome of scientific model accomplishment.

Riordan introduces ethical questions into the fray when he writes, "Or [in the practice of science] are there lasting professional ethics, such as the use of rational argument based on observable evidence accessible to any practitioner?" (p. 3).

In response, I offer a schema for science that includes the following, and more.

- Rational argument must be the zeroth axiom.
- Observable evidence must be reduced to measurements—that is, to comparison against a standard.
- Scientific facts, the foundation of all model building and testing, are measurements with an established accuracy.
- Science is a branch of knowledge, the objective branch, and ultimately public.
- The application of science to public policy with unvalidated models is unethical.

As to the last, such unethical behavior has reached a high point in the history of science in the current vogue of the threat of anthropogenic global warming, a conjecture.

An understanding of the validity of science and scientific criticism, whether about cosmology, or climatology, or physiology and the efficacy of CrossFit, requires knowledge of Riordan's "strict sense" of the terms *conjecture*, *hypothesis*, *theory*, and *law*.

Be aware, now, consensus on the meaning of these terms is fading. The two reviews demonstrate that. In common use, scientists speak at once of probability theory and the laws of probability. Scientifically credentialed individuals advance unvalidated models by proclaiming a consensus. It's an infection like university grade inflation. Nevertheless, here is a guideline that will improve your science literacy, give you a framework for evaluating all variety of supposedly objective or scientific claims, arguments, and models, and hold you in good stead with real scientists.

Science is all about models of the real world, whether natural (basic science) or manmade (applied science, or technology). These models are not discovered in nature, for nature has no numbers, no coordinate systems, no parameters, no equations, no logic, no predictions, neither linearity nor non-linearity, nor many of the other attributes of science. Models are man's creations, written in the languages of science: natural language, logic, and mathematics. They are built upon the structure of a specified factual domain. The models are generally appreciated, if not actually graded, in four levels:

1.A *conjecture* is an incomplete model, or an analogy to another domain. Here are some examples of candidates for the designation:

- "Ephedrine enhances fitness."
- "The cosmological red shift is cause by light losing energy as it travels through space." (This is the "tired light conjecture.")
- "The laws of physics are constant in time and space throughout the universe." (This one is known in geology as "uniformitarianism.")
- "Species evolve to superior states."
- "A carcinogen to one species will necessarily be carcinogenic to another."

2. A *hypothesis* is a model based on all data in its specified domain, with no counterexample, and incorporating a novel prediction yet to be validated by facts. Candidates:

- "Mental aging can be delayed by applying the 'use it or lose it' dictum."
- "The red shift of light is a Doppler shift."

3. A *theory* is a hypothesis with at least one non-trivial validating datum. Candidates:

- Relativity.
- Big Bang cosmology.
- Evolution.

4. A *law* is a theory that has received validation in all possible ramifications, and to known levels of accuracy. Candidates:

- Newtonian mechanics.
- Gravity.
- Henry's Law.
- The laws of thermodynamics.

Conjecture, Hypothesis, Theory, Law

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Each of these candidates can stir arguments worthy of a paper, if not a book, and no model is secure in its position. Weak scientists will strengthen their beliefs and stances by promoting their models while demoting the competition. Some familiar models fail even to be ranked because they are beyond science, usually for want of facts. Candidates:

- Creation science or notions of "intelligent design."
- Astrology.
- Parapsychology.
- UFO-ology.

So, what really is "the trouble with physics"? The Easterbrook and Riordan, the reviewers of Smolin's book with that provocative title, say that it lies not in physics but in the inflation of the string conjecture into a string theory. To understand what the reviewers mean requires the beginnings of science literacy, framed by the definition of science and its four grades of models.

Most citizens wouldn't be interested in these two reviews, much less Smolin's book—even if it were titled "Harry Potter and the Trouble with Physics." The trouble with physics is a technical question asked and answered in the context of the structure of science. Physics will proceed little fazed by the label—"conjecture" vs. "hypothesis" vs. "theory"—applied to the string model.

But many more citizens *will* be acutely interested in whether their school board puts "intelligent design" into its grade school curriculum or into its text book criteria, and how. And a majority of citizens will be personally affected should the United States adopt the Kyoto Accord. Here the charlatans and demagogues are trying to exploit the public vulnerability created by a public school system that has replaced science and mathematics with recycling and self-esteem curricula.

The notion of intelligent design belongs in the public school program. The science curriculum should show that, because science builds on facts (measurements compared to standards as explained above) and because God and the supernatural can never be measured but must remain mysterious and otherworldly, intelligent design and creationism are matters of faith, not science. To a scientist-believer, science takes the measure of what God appears to have done, not of God. Science can never figure out what size Birkenstock God takes.

Just as intelligent design is a threshold question between nonscience and conjectures, anthropogenic global warming (AGW) is a threshold question between conjectures and hypotheses. AGW is a centuries-old conjecture elevated to an established belief by a little clique of quacks who proclaim themselves the Consensus on Climate, guardians of the vault of exclusive knowledge. Does this sound familiar? Is the Consensus patterned after the Council of Trent? As a matter of science, as opposed to a matter of belief, the AGW conjecture is gathering more contradictory evidence than supporting. The layman can test it and understand its failings by applying just the few principles outlined here.

AGW fails the test because it is proclaimed by a consensus. Science places no value on such a vote. A unanimous opinion, much less a consensus, is insufficient. Science advances one scientist at a time, and we honor their names. It advances one model at a time. When the article gets around to saying "most scientists believe...," it's time to go back to the comics section. Science relies instead on models that make factual predictions that are or might be validated.

AGW fails on the first order scientific principles outlined here because it does not fit all the data. The consensus relies on models initialized after the start of the Industrial era, which then try to trace out a future climate. Science demands that a climate model reproduce the climate data first. These models don't fit the first-, second-, or third-order events that characterize the history of Earth's climate. They don't reproduce the Ice Ages, the Glacial epochs, or even the rather recent Little Ice Age. The models don't even have characteristics similar to these profound events, much less have the timing right. Since the start of the Industrial era, Earth has been warming in recovery from these three events. The consensus initializes its models to be in equilibrium, not warming.

And there's much, much more.

Anthropogenic Global Warming is a crippled conjecture, doomed just by these principles of science never to advance to a hypothesis. Its fate would be sealed by a minimally scientifically literate public.

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Now, go forth and scientificate.



He has also worked as a bush pilot for Alaska Helicopters and was a Naval Aviator in helicopters and single- and multiengine aircraft, instructor pilot, and maintenance test pilot, making LCDR in the reserves before resigning with a total of 12 years.

Currently, he spends a lot of time researching and writing for his blog, which contains original material dismantling socalled global warming on the highest scientific standards.

Back Squat Geometry

Part 2 (Video Article)

Mark Rippetoe







Coaching, according to expert lifting coach Mark Rippetoe, is no more than figuring out what to say to people to get them to move how you want them to move. This will vary from person to person, so, as a trainer, your bag of tricks—your ways of explaining and cueing movement and mechanics—must be broad and diverse. But, before that, you need to understand exactly what's going on in the mechanics of lifting and the body positions it requires.

This video continues Rip's discussion of lifting mechanics from last month's journal issue. Taken together, the two videos offer a clear, down-toearth explanation of how and why the principles of force, physics, and human physiology determine the positions that constitute good—safe, effective, and efficient—form for the barbell lifts.

This month's excerpt also contains an impassioned digression into the basis for Rip's long-standing argument that Olympic weightlifters should do low-bar back squats rather than the traditional, end entrenched, high-bar version as a key supplemental strength-building exercise.



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Mark Rippetoe is the proprietor of the <u>Wichita Falls Athletic Club/CrossFit Wichita Falls</u> and writes on various aspects of strength training and barbell exercise. He has 28 years experience in the fitness industry and ten years as a competitive powerlifter. He has published articles in the Strength and Conditioning Journal, is a regular contributor to the CrossFit Journal, and is the author, with Lon Kilgore, of the books <u>Practical Programming for Strength Training</u> and the just-released second edition of Starting Strength, subtitled <u>Basic Barbell Training</u>.

Online Video http://media.crossfit.com/cf-video/CrossFit_JournalRipSquatGeometry2.wmv

http://media.crossfit.com/cf-video/CrossFit_JournalRipSquatGeometry2.mov

Video Article (12:20)

Indoor Rowing Races

Judy Geer

Some of you may remember reading Peter Dreissigacker's article here last winter about training for a personal record (PR) in a 2000m indoor rowing time trial. He also described the CRASH-B Sprints, a.k.a. the World Indoor Rowing Championships, held each February in Boston. Well, it's almost indoor rowing race season again, and this time we're giving you some lead time so you can fine-tune your 2k PR in time to test yourself at the nearest official satellite regatta.

There is a whole series of satellite indoor races held around the U.S. and Canada leading up to the CRASH-B's. These races are open to everyone; no qualifying time required. They all offer the 2k race distance; some also offer longer or shorter events, and some run relays as well. Every year, up to four qualifiers are identified from each satellite race to receive funding from Concept2 for the trip to compete at the CRASH-B's. Qualification is based on meeting a pre-established qualifying time for your gender, weight class, and age group. The full list of qualifying times can be found on Concept2's CRASH-B page.

Find your pace for the 2000-meter race

One of the most important aspects of race preparation is determining your optimum race pace, so that you can manage your output levels optimally throughout the race. In the excitement of race day, it's all too easy to go out too hard, which generally means tiring early and ending up with a disappointing finish. The key to avoiding this is to know your pace ahead of time.

Pace is expressed as time per 500 meters. This is displayed in the central box on the PM.A pace of 2:14 means that, at your current speed, it would take you 2 minutes and 14 seconds to row 500 meters. The smaller the number, the less time it takes to row

How can races in multiple locations and different rowers be fair?

The accuracy and repeatability of the Concept2 Performance Monitor (PM) is what makes the sport of indoor rowing possible. And the self-calibration feature of the PM takes local conditions such as altitude into effect, so that your scores can be compared with those of anyone else in the world, whether their pieces are rowed high in the Rockies or at sea level. It also means national team and collegiate coaches can test and rank their athletes across the board. And, at a personal level, it is a powerful tool in monitoring your own fitness and progress.



500 meters. So, the smaller your pace number, the faster you are rowing. At the end of a fixed-distance piece, your average pace for the piece will be displayed as shown in the photo.

Here is a step-by-step protocol for determining your pace for a 2000-meter race, developed by Concept2 co-founder Dick Dreissigacker.

- Set your PM for a fixed-distance piece of 2000 meters. As you row, it will count down from 2000 to 0 meters. Row the 2K, starting easy, at a pace that you know you can maintain for the whole piece. If you feel comfortable and strong, increase your intensity in the second half of the piece.
- 2. At the end of the 2K row, record your average pace (time per 500) for the entire piece.
- 3. For your next 2k piece, start out rowing at your average pace from the first piece. If you feel comfortable and strong, increase your intensity in the second half of the piece.
- 4. At the end of the row, record your average pace for the entire 2000 meters (time per 500).
- 5. Repeat this process until you close in on the best average pace that you are able maintain for 2000 meters. As you get closer to your real race pace, the 2Ks will get tougher, so be sure to be rested before you attempt each 2k trial. You probably shouldn't do more than one of these test 2ks per week, especially as the race date approaches.

Indoor Rowing Races

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After three or four of these pieces you should be homing in on your target 2k race pace.

This is the pace at which you should start your 2k race. It will take discipline to keep to this race pace but stick with it, at least until the last 500 meters. At that time, if you feel strong, you can go ahead and increase the intensity. In fact, the goal is to completely "empty the tank" by the end of the race. This race pace will also be a good target for interval workouts as you prepare for the big event.

Online rankings and personal logbooks

If you can't find a nearby race on a day that works for you, you can still find out where your 2k PR stacks up by entering it in the Concept2 online ranking. Just select your choice of race distance, age group, gender, country, etc., and you'll get a ranked listing of everyone in the world who has submitted a PR to the ranking.

In order to submit your own PR, you'll need to set up an online logbook for yourself on the site. Then you can enter all your workouts, and when you have a PR, you can click on the "Rank" button to submit it to the ranking.

Even if you don't want to submit your PR, the personal log is a good resource for tracking your own progress. You can:

- Enter and keep track of all of your workouts online.
- See a list of your personal world ranking entries.
- Access your personal pace chart history, comparing workouts of similar distance or time with each other.
- See weekly and monthly summary statistics as well as total meters and time.
- Export your log to a text file.
- See your average daily meters since your first row of the season.

More CrossFit Journal articles on preparing for an erg race

 "Strategies for a Seven-Minute 2K on the Concept II Rower," by Greg Glassman (November 2002)

• "Row Fast: How to Prepare for an Erg Test," by Peter Dreissigacker (Feb 2007)

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.



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

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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.

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