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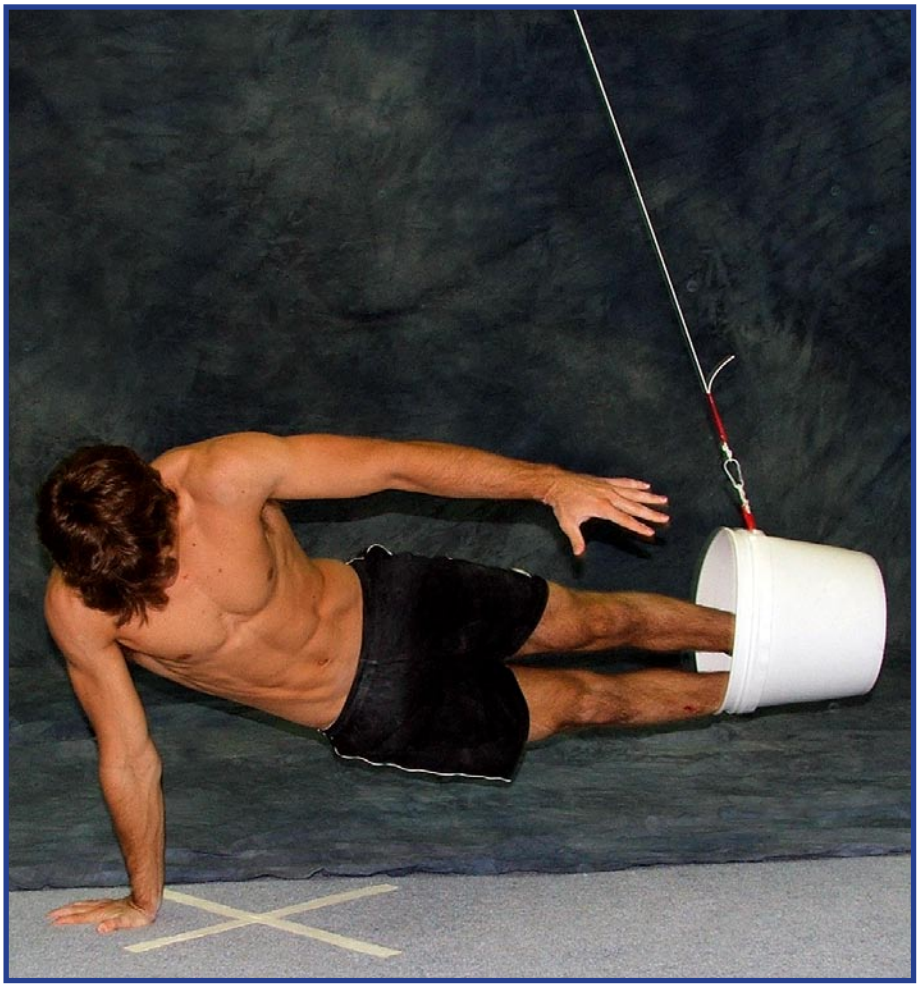

Bucket Circles

Phil Savage

A simple rope and bucket contraption is used quite extensively by gymnasts of all ages and abilities to support the feet and teach good body position while training basic circles on the pommel horse (one of the six Olympic events for men). These exercises, "bucket circles," are used almost exclusively by gymnasts, but I've found them very beneficial in improving the upper body and core strength of other athletes as well. High-level pole vaulters (Lawrence Johnson, 2000 Olympic silver medalist, and Tim Mack, 2004 Olympic gold medalist and record holder), decathletes (Tom Pappas, two-time world champion), swimmers and divers (Evan Stewart, 1997 one-meter world champion) have all used this device in my gym and greatly benefited from it. It's a simple idea, yet the strength and coordination one gains from using it properly is immeasurable.

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Bucket Circles

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The bucket and rope is, without a doubt, one of the best overall core-strength builders that I use. A basic principle that I always try to implement with my athletes is something I call strength with movement. Working bucket circles properly, helps teach athletes to maximize their strength from the hips to the shoulders. You'll feel a complete workout in the abdominal area and entire trunk, deltoids, latissimus dorsi (lats), trapezius, pectorals, and rhomboids. Remember, in order to properly execute a bucket circles, you have to work the exact muscle groups necessary to maintain the correct body "shape" required to successfully execute these circles. Not only are you trying to coordinate several circles, you're trying not to fall down. You're essentially balanced on two arms (and briefly on one arm) while circling your entire body around your hands. This, in itself, requires a lot of strength and muscular stamina. This strength with movement exercise is great for total body strength coordination. By this I mean, you're coordinating the large muscle groups (lats, pecs, traps, delts, "core," etc.) with the hundreds of smaller, even more important, muscles that exist that wouldn't otherwise be used by conventional strength exercises.

The setup

The only apparatus you need for bucket circles is an inexpensive plastic bucket suspended from a rope (photo 1). It doesn't take up much space and can be installed in a garage, basement, or even hung outside from a tree branch. All you need is a ¼-inch nylon rope about 6 to 12 feet long (depending on the height of ceiling), a 3-gallon plastic bucket (from a hardware store), a 6-inch steel eye screw and a swivel. Notice how I placed an X with tape on the floor directly under the suspended bucket. This dead-center mark is where you'll place your hands once you are ready to start.

Photo 2 shows the entire device, with the bucket is suspended (in this case from an 8-foot ceiling) so that it is about 8 to 10 inches off the ground. We use a flat surface on the ground such as carpet or foam, but sometimes gymnasts use a floor mushroom or floor pommel horse to put their hand on. For the average user at home, however, a flat carpeted or padded surface will suffice. Ideally you should have clear open space of about 10 feet by 10 feet.

Photo 3 shows the proper way to place the feet inside the bucket. The best way is to not wear shoes. We go with socks and/or a towel covering both feet and ankles. For best results, try not to have any skin touching the inside of the bucket, both to protect the skin and to allow for smoother twisting of the feet and legs inside the bucket as the performer is turning his/her "circles."


Photo 1

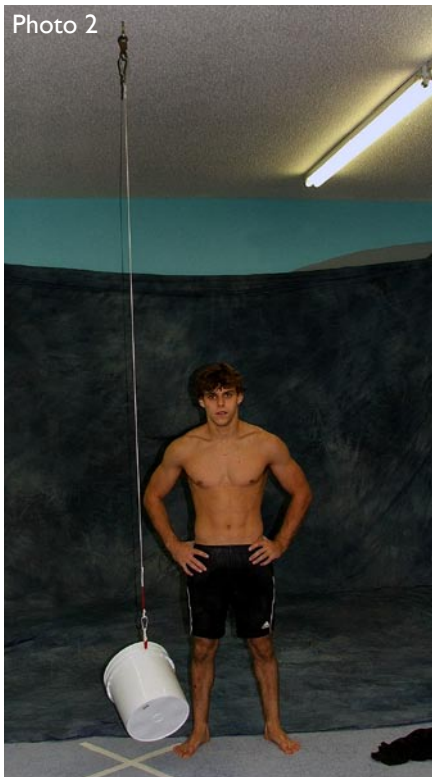
Photo 2


Photo 3

Bucket Circles

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The sequence

Our demonstrator, Colin Payne, is in the proper "start" position in photo 4. Imagine for a second, if you will, that you're looking down at Colin from the ceiling and he's on a compass. He is in a standard push-up position with his feet in the bucket and his head and shoulders are facing "south." His feet would therefore be facing "north." His hands are on the X on the carpet (about shoulder width apart) and his feet are in the bucket and suspended about 8 to 10 inches off the ground. It is imperative that the shape of the body be in a slight arch, with the shoulder blades pinched together. The hips are not lifted up (or "piked"). As a good starting drill, and for those new to this device, you can begin by assuming the "start" position and simply pick up your hands one at a time (alternating from right hand to left) while keeping the body rigid. Repeat this process over and over until you develop the strength and confidence to go to the next step.

Photo 4

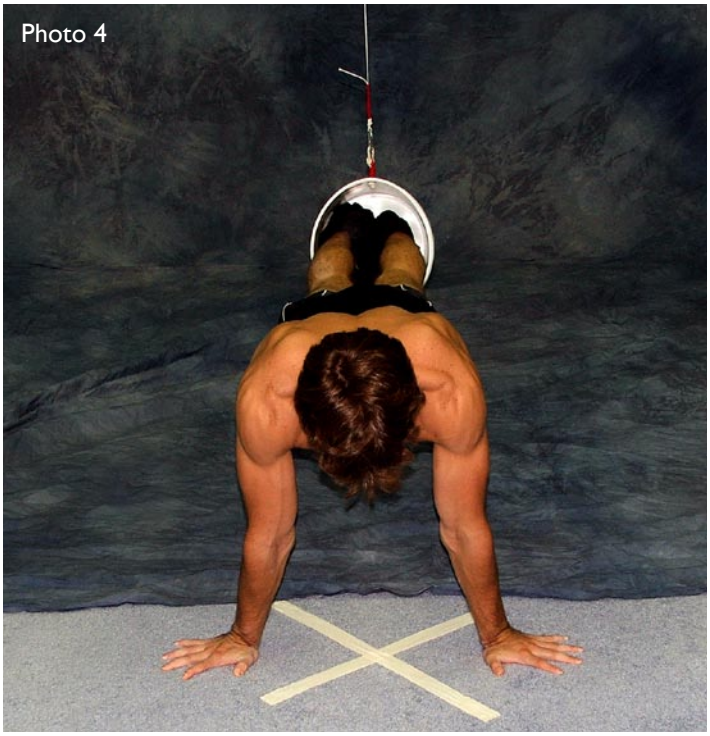


Photo 5 shows what we call the "enter" phase of the circle. Here, Colin is moving his entire straight body (by pushing the bucket with his feet) around to the left, or "west." He picks up his right hand, allowing his body to pass under so that he can eventually swing the bucket toward the viewer. (Photo 8, later in this article, shows the lateral view of the position after the enter phase. This we call the "rear support" phase.)

Photo 5

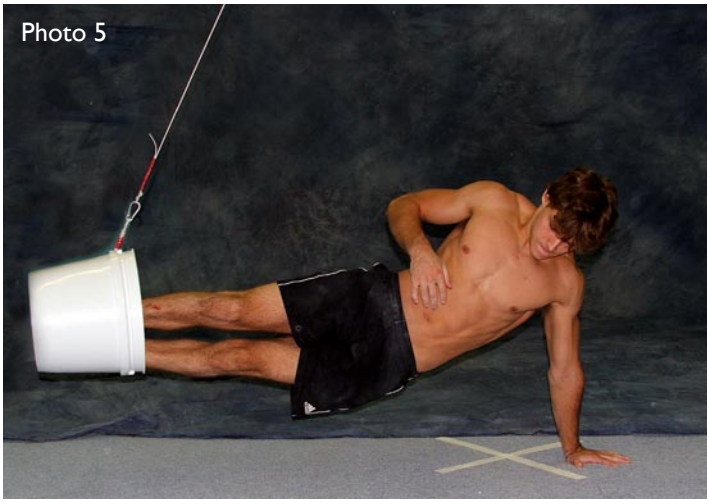
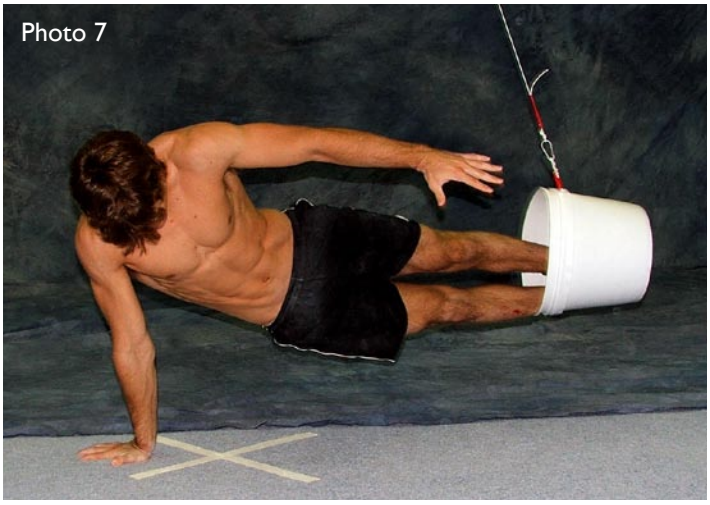


Photo 6 shows the body and bucket moving together from left to right. Keep the entire body as straight as possible from shoulders to toes. Be patient. Maintaining as straight a body line as possible throughout the entire 360 degree circle that your body will travel is likely take several days or even weeks to master. This is core strength.

Colin is about to complete the circle in photo 7. Remember, he's moving the bucket in a counterclockwise motion. He plants his right hand on the floor. His shoulders and head are constantly facing the viewer ("south"), his eyes are looking out and down, and now he's "exiting" the circle by lifting his left hand, allowing his entire *straight* body to pass under and get ready to go back to and through the start position (photo 4) and repeat the entire circle.

Photo 6

Photo 7



Bucket Circles

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The positions

The direction of your circle (clockwise or counterclockwise) is totally up to you and is only a matter of personal preference. The demonstrator in this article is most comfortable circling in a counterclockwise direction. You might want to try to experiment and swing also in a clockwise fashion to see which direction feels normal and comfortable for you.

For reference, photos 8 and 9 show still shots of two of the crucial body positions. Photo 8 is of the "rear support" position, taken from a lateral point of view. Notice the nice straight body line. Photo 9 simply shows the start/finish position of the circle. We call this the "front support." Again, the line of the body is straight and tight from shoulders to bucket. Keep in mind that the hands are shoulder width apart and on the X mark on the floor.

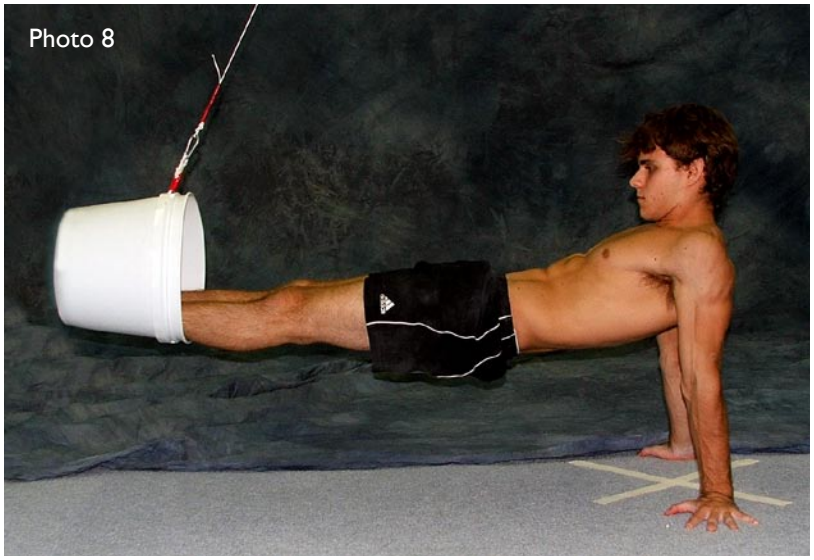
Photo 8

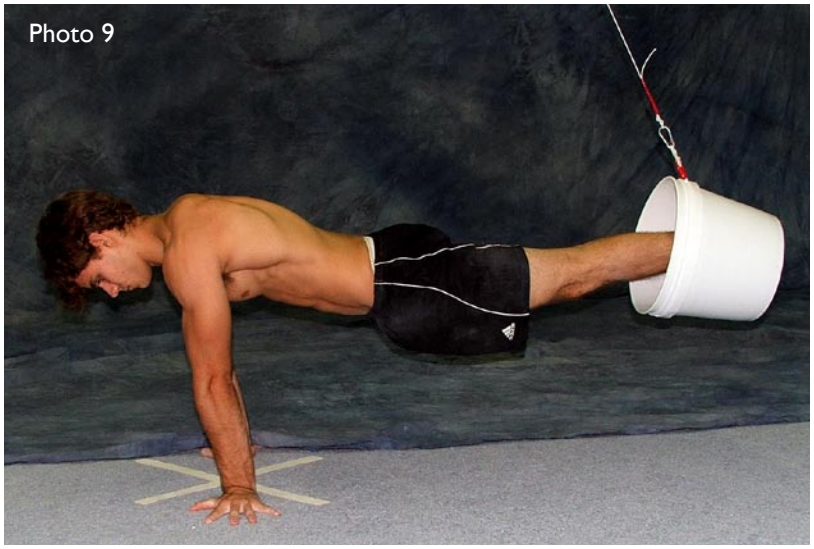
Photo 9

To keep things simple while training on this device, try to keep your shoulders, head, and hands facing the same direction while doing the circling action with your body.

When you first start to learn your circle, I recommend that you begin with trying to achieve just one *correct* circle. Mastering the proper technique is imperative to the success of this exercise. Once you've mastered the proper body shapes and have become proficient in one perfect circle, go ahead and try several of them. Over time, you can do several in a row without interruption and with a good rhythm. With the more advanced gymnasts I coach, I can expect them to each do about forty perfectly aligned consecutive circles in about 45 seconds.

Forearm circles

Photos 10 through 13 are all different images of the same circling action. However, in this case Colin is on his forearms throughout the circle. This is a much more advanced technique and obviously much harder to perform since your entire body and center of gravity are now much closer to the ground. Bucket circles on the forearms require the athlete to maintain an even straighter body line from feet to shoulders in order to master the complete 360 degree circle. Once you can do the normal circle on your hands with straight arms with ease, the forearm circle would be the next logical progression. It's especially good work for the abdominals as well as the upper back.

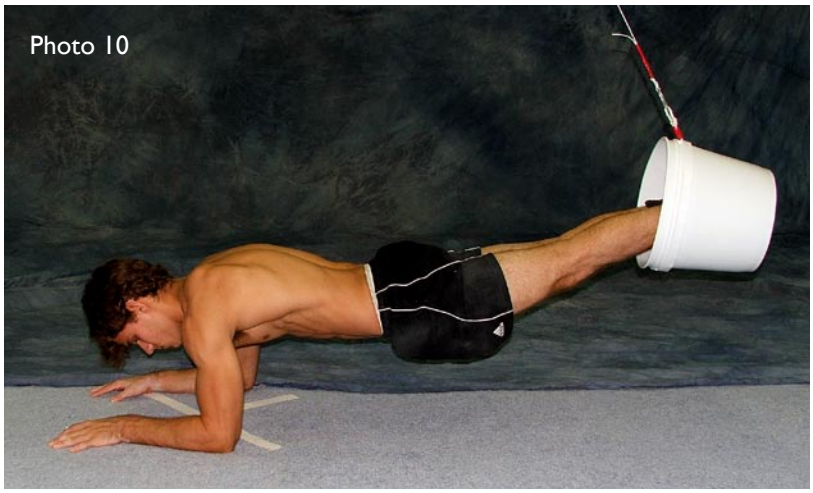
Photo 10

Bucket Circles

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What I like to do with my gymnasts is to alternate five standard circles on the hand support and then, without stopping, dropping down to the forearms for another five circles, and then, without missing a beat or breaking rhythm, step back up to the standard position for another five circles. Then repeat. Multiple rounds of this add up to some serious work (and your triceps will make themselves known when you're stepping up from the forearms to the hand support).

Bucket circles are an incredible exercise that will improve your upper-body and core strength dramatically. And because you are concentrating so hard on maintaining correct body positions, learning the rhythm, and focusing on just staying up, you almost don't realize how hard your body is working. You train strength, stamina, flexibility, coordination, accuracy, agility, and balance all in one fun exercise. That is the antithesis of "dumb PT."

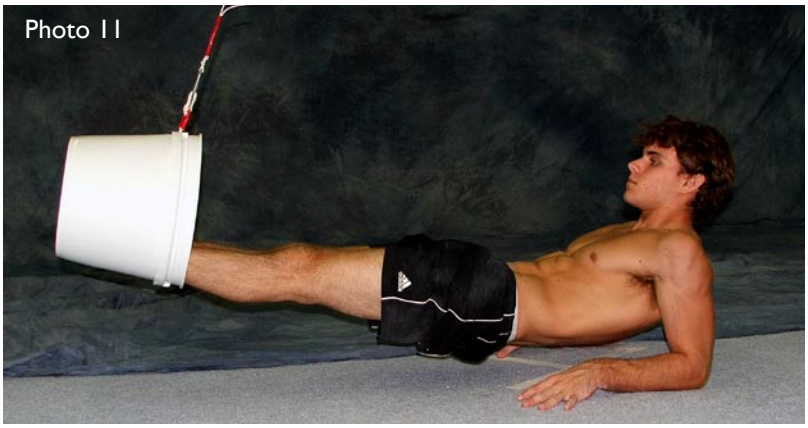
Photo 11

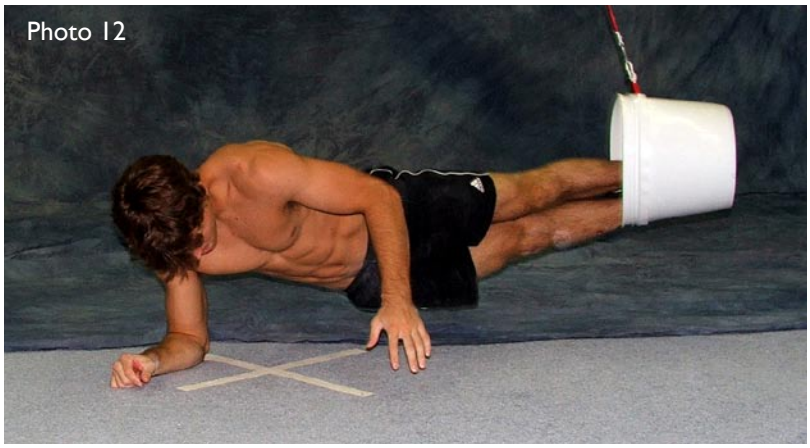
Photo 12

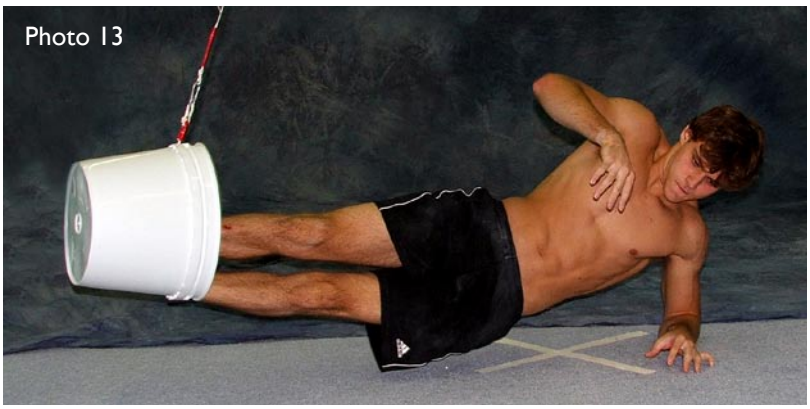
Photo 13

Phil Savage is a gymnastics coach and photographer in Knoxville, Tennessee, where he owns and operates a 32,000-square-foot gymnastics and cheerleading facility with his wife, Lisa. He first started gymnastics in 1964 and competed at elite levels from 1975 to 1980. Since then he has coached thousands of athletes of all ages and abilities and travels to other gyms to teach coaches and trainers how to teach gymnastics. He was the first coach inducted into the Tennessee Gymnastics Hall of Fame (2006), and he's also in the Guinness Book of World Records for the fastest mile walked on the hands in a 4-man relay.

Bad Form

Mark Rippetoe

I was driving home the other night, listening to the radio, and the guy filling in for Art Bell on Coast to Coast AM was talking to some other guy about Nazis, UFOs, the Kennedy Assassination, time travel, and George Bush, and how it all relates to OneWorldGovernment. This, of course, made me think about barbell training, and it occurred to me that good form on the barbell exercises should not be a matter for debate. People should not be entitled to their own opinion about it, any more than they are entitled to an opinion about the value of *x* in *3x - 10 = 60,* or whether the Grays pulled off the Bay of Pigs. Good form (or technique, or kinematics, or whatever you'd like to call doing it right) should depend on the logic of a dispassionate analysis of the body-and-barbell system in the motion required by the exercise, and that's about all. The exercise is chosen to work a particular movement pattern normal to the human skeleton, the bar has a certain path it most efficiently travels through space for the exercise, the skeleton must move in ways defined by its segment lengths and articulation points to enable this bar path, and the muscles must move the skeleton exactly this way. Anything that deviates from this is Bad Form.

Why is bad form a problem? Two reasons come to mind immediately. First, shoving joints into positions they are not designed to occupy presents potentially significant safety problems, although not of the magnitude you may have been led to believe. And second, allowing joints to assume positions they are not designed to occupy means work that should have been done by the muscles anatomically designated to move the bones in question actually got done by *other* muscles, whose proper function in efficiently performing the movement got circumvented by your inattention to detail. It really boils down to that: bad form—for people who know better—is just a willingness to do the movement the wrong way because that's the way you've been doing it. And the right way is better because eventually you can lift more weight correctly, in addition to the fact that you're less likely to get hurt.

If I had a nickel for every scary deadlift I've seen at high school powerlifting meets, I actually wouldn't have more than about five dollars in nickels because I quit going to the damn things after I'd been to just three or four of them. I do not enjoy seeing the egos of coaches take precedence over the spinal integrity of athletes. Little skinny kids trying to open with 405, when their backs are not capable of staying flat with 225. Beautiful little 15-year-old girls stuffed into squat suits, low backs rounded into complete flexion on their opening attempts. Big, potentially strong kids doing the lifts with technique that passes for legal at a meet of this type, with weights that they cannot lift correctly—that is, in a way that satisfies the rules of biomechanics that govern safety and efficiency. I witnessed lots of high squats in spinal flexion, hitched deadlifts in spinal flexion, and coaches and referees behaving as though this was Just Fine. It is truly amazing that more kids are not hurt in activities of this type, and that in itself tells us something about the nature of healthy human bodies and the actual injury potential of barbell exercises.

Yes, it's harder to hurt people with barbells than we've been led to believe. If Lamar Gant can deadlift over 700 pounds with severe scoliosis and 15-year-old girls can squat 300 pounds with form that would make an actual strength coach turn away in shame and embarrassment, bad form cannot be all that dangerous, at least in terms of the potential for catastrophic injury. Weightlifting, powerlifting, and weight training are actually far safer activities than, say, soccer, despite the fact that most people do lots of things wrong most of the time. The vast majority of the serious injuries and fatalities associated with weight training are the result of unspotted bench pressing, usually at home. The chances of needing to leave the gym in an ambulance are vanishingly small (although once, a long time ago, a new guy actually called an ambulance when his legs began to cramp after a squat workout—I was gone at the time). During the thirty years I have been in the gym business, aside from a few broken toes, there have been no serious injuries at my gym that required medical attention.

> *Bad form changes the nature of an exercise from efficient to inefficient; it changes the way the bones move the load, and in doing so changes the contribution of the muscles that are supposed to move the bones.*

Now, there have been lots of people who have gone to the doctor unnecessarily—me among them, long ago—for injuries that doctors are not particularly good at either understanding or treating. It may have seemed necessary at the time, because we are raised to think that you see a doctor when you're hurt. But after the third time you hear, "You just pulled a muscle. Take these pain killers, these muscle relaxers, and these anti-inflammatories. And stop lifting so much weight," you quit going to the doctor unless bright blood is actually spurting from an artery.

As a general rule, acute injuries in the gym are usually back tweaks, the kind of thing that chiropractors and PTs can sometimes help with. These injuries are most often spinal in nature, affecting the facet joints, one of the small ligaments between adjacent vertebrae, the nerves immediately proximal to these structures,

Bad Form

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or a combination of the three. Sometimes an intervertebral disc is involved, but not usually. When chiropractic or physical therapy works, it has been my experience that it usually does so within two or three visits, thirty not being particularly useful for anything except the bottom line of the chiropractor or PT. Painkillers and muscle relaxers don't help them heal faster, but they may make it easier to get to sleep and to train around and through the injury, which *will* help it heal faster (but which is usually advised against by the people who write the prescriptions). Anti-inflammatories are quite useful but do not require a prescription; I buy my Equate ibuprofen at Wal-Mart.

Back tweaks usually occur in one of two situations: 1) under light weights where good form is not being observed, either through negligence or inexperience, or 2) under heavy weights, where good form breaks down due to the load. They are almost never "muscle tears," because muscle tears usually occur in muscle bellies, in muscles that either accelerate or decelerate motion around a joint that moves at a high angular velocity, like a quad, a hamstring, or a rotator cuff muscle. Massage may help the muscles relax, but massage in and of itself cannot affect the cause of the pain. These types of injuries usually heal within two weeks whether you do anything to treat them or not, unless a disc injury has occurred. Competitive lifters get used to them and learn to train around them, often by performing the very exercise that caused the injury using perfect form, very light weights, and very high reps.

It is not impossible to pull other muscles, and hamstring, quad, and pec tears occur even when using good form. Tears happen when the force of the muscle contraction is overcome by the resistance so rapidly that it cannot be compensated for by the other muscles. Leg muscles tear when running or when training with weight explosively; pecs tear when benching explosively, or with max weights that, once the tear starts, cannot be unloaded quickly enough. Sometimes tears result from agonist/antagonist strength imbalances, or fatigue, or when the extensibility of muscle bellies is exceeded by uncontrolled range of motion. Sometimes it is bad form.

Overuse injuries, another common variety, usually involve joints or the muscular tissue in very close proximity to joints. Bad form often predisposes one to these types of injuries, by causing joints to move in ways that tendons and ligaments are not happy with. Many chronic shoulder injuries started out in life as incorrect bench presses and grew up to be rotator cuff surgeries. The mechanism of this rotten situation will become apparent.

The reality of the situation is that when a lifter reaches the point where the amount of weight lifted becomes more important than increasing strength—when you lift as a sport, not to strengthen for another sport or for general fitness—you will be lifting enough weight to get hurt. Any competitive sport is dangerous; lifting as a sport itself is competitive; and that's just the way things are. Lifting for strength and conditioning is different, and much, *much* safer.

Bad form is to be deplored not just for its potential risk but also for its potential to keep us from getting stronger. This is because bad form occurs when a movement pattern is executed inefficiently, the bar being moved by bones traveling through space in a way that does not maximize musculoskeletal efficiency. And this occurs when work is being avoided by muscles that should be doing it, in favor of muscles that shouldn't. It happens when novice lifters learn things wrong, something that may not be entirely their fault. It also happens when experienced lifters allow their form to deteriorate, either unconsciously, through a lack of concern for good form, or intentionally, by cheating a movement to lift more weight than their strength using good form will permit.

Good form on the barbell exercises should not be a matter for debate.

This biomechanical stuff is rather dry, and that's probably why sensible, interesting people don't either write it, read about it, or call in about it on Art Bell. So I'll try to make the rest of this as "interesting" as I can.

For example, when you allow your hips to come up before your chest in a deadlift—when your back angle changes before the bar leaves the floor—your knees have extended. You know this because your back angle can't change unless either your knee or your hip angle changes, and in this case it's primarily your knee angle. This means that the muscles that extend your knees, your quads, did in fact extend your knees but did not lift the bar when they did so. They moved the knee joints, pulling the shins away from the bar, but did not produce any work against the load. Now when the bar is lifted, the entire work of the deadlift will be done without significant contribution from the quadriceps. This means that the hip extensors—the glutes and hamstrings—have to do all the work by themselves. The normal job the hip extensors do as the bar comes off the floor is essentially isometric; they maintain the back angle by anchoring the pelvis, so that the quads can extend the knees to push the bar away from the floor. It's not that the glutes and hamstrings aren't working at the bottom of the pull—they certainly are—but their work at this position enables the quads

Bad Form

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to do their job. So if you fail to keep your chest up as the bar leaves the floor, you allow the quads to puss out, changing the role of the hamstrings from antagonists to agonists off the floor. This should be obvious to even the dullest Sasquatch, or "Bigfoot," if you prefer the colloquial term.

This is bad form and a perfect example of its effects. Bad form changes the nature of an exercise from efficient to inefficient; it changes the way the bones move the load, and in doing so changes the contribution of the muscles that are supposed to move the bones. Instead of all the muscles in the system making their anatomically efficient contribution to the loaded movement, when form is bad some muscles do more than they are supposed to and some do less. You know this because a stiff-legged deadlift (SLDL), the intentional version of this particular example of bad form, has a lower 1RM than a deadlift even though the bar moves the same distance. A SLDL is a useful assistance exercise when done as an adjunct to deadlift training, but when it comes time to lift the most weight, it would be terribly unproductive to confuse the two movements. Aside from the reduced efficiency, the SLDL's back angle places maximal torque on the low back, by increasing the length of the lever arm between the load and the axis of rotation (i.e., the extending hip joint) and by applying that load at right angles to the moment arm. This dramatically increases the stress on the muscles and ligaments responsible for maintaining spinal extension—not a bad thing if you're doing it intentionally (SLDL), but counterproductive if you're trying for a new PR (no new PR), as even the most inexperienced time traveler will tell you.

Why would a lifter find it advantageous to intentionally or deliberately avoid using a major group of muscles that obviously make an important contribution to a lift? After all, if the hamstrings and glutes are strong enough to do all the work of lifting the bar off the floor without the help of the quads, they are certainly strong enough to function in their proper isometric role of anchoring the back angle so the quads can work. Well, it's seldom intentional, because if it is, it's a SLDL. And it's never an advantage to move a load inefficiently. It is usually just learned wrong through a lack of feedback at a crucial time in the learning process. Or sometimes it's form creep, bad technique acquired so gradually that it is never perceived as wrong until someone else does you the favor of pointing it out (and let's hope that you're gracious about it when it happens). Sometimes it is the result of a movement pattern altered when training through an injury, and the resulting strength imbalance may fail to be addressed when the injury is finally healed. But failure to correct it once you know about the problem is either laziness or an unwillingness to back off to lighter weights until good form has time to strengthen the muscles that have not been making their proper contribution. This was identified as a problem by CIA remote viewers back in the 1970s.

Furthermore, I'll go out on what I hope is not too skinny a limb here and state that bad form in all basic barbell exercise is of the same type: using muscles in ways that reduce efficiency, increase the chance of injury, and reduce training productivity by moving bones in ways that are not mechanically optimum. "Mechanically optimum" means keeping the load directly over the point of balance at the end of the kinetic chain (the mid-foot in standing barbell exercises and directly above the point on the bench where the vertical arms support the bar in the bench press) while moving the load with the shortest possible lever arms.

The concept of the lever arm, or moment arm, is important to understand. A lever arm is the distance along which force is applied to an axis of rotation, like a wrench turning a bolt, or an axis of potential rotation, like the bar on your back applying force to your hips in a squat. The bones of the skeleton transfer force generated by the contraction of the muscles attached to them to the load, and the bones rotate at the joints. The part of the body between the load and the ground is referred to as the "kinetic chain" because it is what produces the movement. For all the barbell exercises that involve standing with or under the bar and that involve more than one joint in the movement, the greatest efficiency occurs when the weight is moved in a way that keeps it directly over the point on the ground where the weight of the system is in balance. For humans this point is the middle of the foot, because that is where the average weight distribution against the ground is centered. When the weight is heavy, all the movement of the weight must occur as nearly vertical to this point as possible, or the weight/body system is out of balance. The bones that transfer muscular force to the load must move in ways that keep the load over this position. Any skeletal position assumed during the movement that places the load over some point other than the mid-foot creates a lever arm between the load and the mid-foot, and that leverage adds to the resistance of the load. During the movement, if a lever arm is created between the mid-foot and the load, the effort being generated to move the load will change to an effort not to fall over on your ass. The only place this cannot happen is Area 51.

And even if the system is in balance over the foot, a lever arm may appear between the bar and the joints moving the bar. The distance between the joints extending under the load and the bar itself should be minimal, and if the length of the lever arm begins to exceed that which can be dealt with efficiently (as when you lean back away from a press), the lift will not be completed. This is the principle that enables alien craft to travel

Bad Form

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between star systems to kidnap unsuspecting victims for bizarre rituals that are only remembered under hypnosis.

Squatting and pulling from the ground both involve the generation of force by the hips and legs as they react against the ground, and the transfer of that force up the rigid spine to the load, which is either at the top of the spine in the case of the squat or hanging from it at the end of the arms in a pull. Squats and pulls differ in 1) the position of the bar at the point of force transfer (on the back or hanging from the arms), 2) the hip/knee range of motion dictated by the location of the bar (on the back versus on the ground), 3) the eccentric versus concentric nature of the two movements, and 4) the amount of Nazi mind-control technology involved.

For any squat, short lever arms are a part of the balance problem, because the squat carries the bar on the torso (or directly above it in the case of the overhead squat), with a roughly equal distribution of body mass on either side of the bar, so that the center of mass of the system is essentially directly over the mid-foot. If the thighs and feet are parallel and the rigid back is at the correct angle to keep the bar over the mid-foot, the hips can very efficiently solve the problem of maintaining balance and short, efficient lever arms. The common form problems in the squat upset this balanced lever arm relationship and result in the biomechanical inefficiencies that typify bad form. If the knees cave in toward the middle, the quads are being asked to do the job of the adductors, and, as in our earlier example of the hamstrings in the deadlift, they are strong enough to do it, even though it leaves the adductors untrained and ultimately weakens maximal squat capacity. The femur and the tibia, which normally operate vertically parallel as the knee flexes and extends, deviate inward (toward the midline) at the knee, squishing the lateral meniscus in the knee joint due to the uneven load. The bones move wrong, the muscles move them that way, and the muscles get trained wrong as a result. And this is how you know that the extraterrestrials are responsible for the recent increase in gas prices.

The problems are obvious if the back rounds in either a squat or a deadlift. It is hard to maintain a tight isometric spinal erector contraction with a heavy bar hanging from your shoulders. If your back is weak because you let it get that way, the trunk muscles fail to do their job and thus remain unworked in favor of letting the spinal ligaments try to keep the vertebrae in position. Since they can't do this very well, the intervertebral relationships go bad, with the discs and the facet joints jammed into positions they'd rather not occupy. And since the muscles fail to maintain a rigid trunk, the force being transmitted from the legs and hips through the trunk to the load—whether sitting on the upper back or the shoulders, supported overhead, or hanging from the arms—gets partially absorbed in the wiggle. This makes for a sloppy job of applying the force, like hitting a burglar with a pillow instead of a bat. And it's all because you failed to maintain the correct spinal alignment, either when you were learning or when the weight got heavy later. But then again it could have something to do with Air Force con trails.

The deadlift is different from the squat in that most of the body is behind the bar, not under it, as it hangs from the arms under the shoulders. Think about the difference between a barbell deadlift and a trap-bar "deadlift" and you can see the situation. The load, which consists of you and the bar, still needs to be over the middle of the foot, and as the weight gets heavier the position of the center of mass of the bar/body system more closely approximates the position of the bar (as your mass relative to that of the bar becomes increasingly less significant). Short lever arms for the deadlift are maintained by keeping the shoulder blades over the bar, with the best back angle your anthropometry will permit. This is a means of keeping the linear distance between the hip and the scapula as short as possible—as vertical a back as the proper bar/scapula relationship will permit—so that the lever arm formed by the back is as short as possible. Likewise, the bar has to stay over the mid-foot so that the lever arm between the bar and the balance point on the floor is as short as possible, preferably zero. This is also true for cleans and snatches as they leave the floor, up to the point where the second pull starts. And just what were those lights in the sky last night? C'mon, be honest with us *this one time*.

In overhead pressing, the muscles that attach to the humerus and the elbow must drive them up while the bar held in the hands at the end of the forearms stays in position directly above the elbows and directly over the mid-foot. It involves a simultaneous elbow flexion and shoulder extension, while the torso is held in the position that maximizes the efficiency of the actions of the shoulder and elbow joints against the load. For the press, if the bar stays in balance over the mid-foot as it should, the primary lever arm in question is the horizontal distance between the bar and the shoulder joint. This is shortest when the bar is closest to the shoulder, and consequently the face, which makes the nose a wonderful target for the bar for efficient pressing. The most common form problem involves the failure to maintain this close distance, whether through pushing the bar away, leaning back away from the bar, or failing to get under it as it passes the top of the head. In all three of these cases, the trunk muscles fail to hold the torso in the correct position close to the bar, placing the pressing muscles themselves in the unwelcome position of having to overcome what might be rapidly increasing leverage problems. The role of the abs in pressing is important, and good pressers have thick abs. Bad pressers don't develop thick abs because they are

Bad Form

...continued

too busy leaning back, not using them. And in all likelihood, bad pressers are responsible for the recent rash of animal mutilations we've been hearing so much about.

Failing to maintain a vertical forearm creates another lever arm, one that should not even be there, between the bar and the elbow. This relationship normally involves no torque at all. But if the anterior chest muscles—the pecs and frontal deltoids—fail to keep the humerus pulled forward so that the elbow stays under the bar and the forearm stays vertical, the smaller forearm muscles are called upon to overcome the torque produced when the bar is in front of the elbow. If the elbows, conversely, are lifted up too high, like the rack position of the clean, another lever arm is created that should not be there; the remaining movement will look more like a triceps extension than a press. This happens when the lats fail to do their job of providing posterior antagonist support for the humerus as the delts and triceps act on the load that should be right over the elbow, a problem compounded when the torso fails to remain upright and rigid. The Reptilians, of course, solved this problem eons ago while building the pyramids.

Bench pressing is simpler because the kinetic chain—the distance between the hands and the upper back where it mashes into the bench—is shorter and therefore involves fewer joints. Like the press, benching involves a shoulder flexion and an elbow extension, and like the press it depends on a tight lineup between the bar, the elbow, and the shoulder joint to minimize the length of the lever arm between the load and the shoulder. We are not powerlifters, most of us anyway, and we use the bench to get strong, not really to see how much we can bench. So we need to use the technique that most effectively strengthens the muscles used in the bench press. Heaving the bar up using the hips as a part of the rebound is an excellent way of lifting more weight, since it recruits lower body muscles into the exercise. It is also an excellent way of avoiding an opportunity to strengthen the upper-body muscles that the bench is supposed to work. Had the Atlanteans only known this, they might still be around today. Or maybe they are.

A missed bench press most commonly involves the elbows failing to remain directly beneath the bar when the delts and the pecs fail to do their job of keeping the bar and the joints lined up. The elbow typically drops down toward the ribcage, increasing the horizontal distance between the bar and the shoulder. This is normally accompanied by bridging the hips up off the bench, which, among other things, attempts to shorten this lever arm by increasing the angle of the chest and bringing the elbows more in line with the shoulders. This is a little hard to visualize, but no harder than imagining the problems involved in the enormous task of constructing the Face on Mars.

There are countless other examples of bad form, and if you think in these terms as you train and watch others train, it will become apparent that what is happening is the incorrect use of the skeleton, which results in the incorrect use of the muscles. Good form is not arbitrary, and its purpose is not aesthetics. It is based on a logical analysis of the relevant mechanics—what works and what doesn't—and what you or I feel about that should be irrelevant. Good form is based on human anatomy and the physics of movement and should be harder science than that which is normally discussed late at night on the radio. It may not be as much fun, but it will be of more immediate benefit than Edgar Cayce could ever have predicted.

Mark Rippetoe listens to the radio late at night while driving home from *Wichita Falls Athletic Club/CrossFit Wichita Falls*. He has spent 28 years in the fitness industry and 10 years as a competitive powerlifter. He has been certified as an NSCA Certified Strength and Conditioning Specialist since 1985 and is a USA Weightlifting Level III Coach and Senior Coach, as well as a USA Track and Field Level I Coach. He has published articles in the *Strength and Conditioning Journal*, is a regular contributor to the *CrossFit Journal*, and is the coauthor of the books *Starting Strength: A Simple and Practical Guide for Coaching Beginners*, *Practical Programming for Strength Training*, and the forthcoming *Basic Barbell Training*.

The Kettlebell Press

Jeff Martone

Pressing weight overhead has been one of the classic tests of strength for centuries. Pressing barbells, dumbbells, kettlebells, sandbags, logs, bodyweight, etc. all have their place in a well-balanced training program, and all offer slight variations in stimulus and technique. Kettlebells, like dumbbells, have the advantage of permitting either one-arm or two-arm lifts, and they are biomechanically easier on the elbows and wrists than barbells and most odd objects, Regardless of the implement used, the tips and techniques outlined in this article will increase your strength and safety while pressing your implement of choice. The difference is in the details.

I know many people who have completely removed pressing movements from their training programs because they tend to aggravate a chronic wrist, elbow, shoulder, or back injury. If this is true for you, try the exercises below and pay attention to the subtle techniques of generating maximal tension before completely throwing in the towel on presses. Begin with a light weight, be patient, and practice the high tension skills as outlined below.

Execution

1. Clean one kettlebell to the racked position at the shoulder (i.e., with you hand below your chin, elbow in contact with your torso) (photo 1).
2. Pause motionless in this position for long enough to make sure you will not be using the momentum generated by the clean for the press. Be sure to keep your focus straight ahead.
3. Press the weight upward with your knees locked. Grip the floor with your feet, contract your quadriceps and pull your knee caps upward. Keep your glutes and abs tight, minimizing back bend (photo 2).
4. Recruit your lats, biceps, and grip while pressing. (See the strength tips listed below.)
5. Actively exhale (i.e., through clenched teeth) while pressing the weight up.
6. Lock out your elbow and pause motionless with the weight overhead (photos 3 and 4).
7. Working in the same line of action, actively pull the weight back down to the racked starting position.


Photo 1

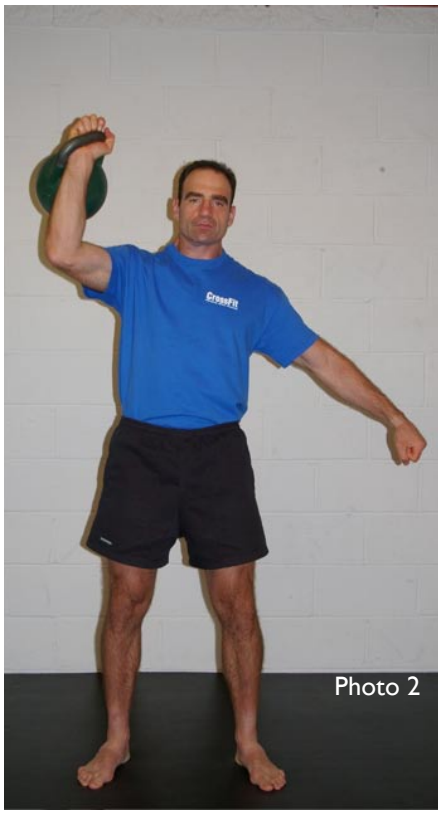
Photo 2


Photo 3

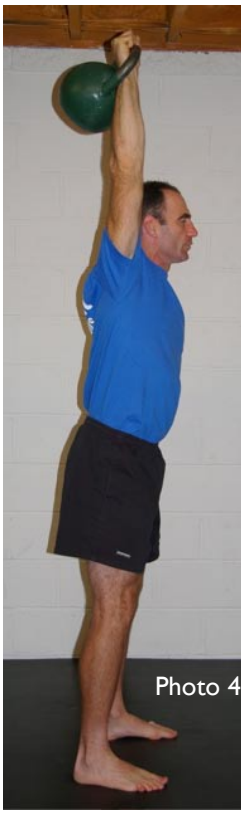
Photo 4

The Kettlebell Press

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Strength Tips

- It is important to instantly contract your abs, glutes, and armpits (lats) when you receive the kettlebell. This action is similar to that of taking a body punch; exhale on contact. You can practice heavy kettlebell cleans to help improve your skill at loading the tension for the press.

- Recruit your grip.
  - Crush the handle of the kettlebell, especially at the sticking point.
  - Make a fist with the free hand in one-arm presses, especially at the sticking point.
  - Try squeezing a gripper or a ball in the free hand. I found this practice to be extremely helpful in overcoming sticking points (photos 5 and 6).

- Recruit your biceps.
  - Keep your forearm vertical at all times.
  - Don't press a kettlebell straight up but slightly to the side and spiral it upward. It makes for a more efficient use of your shoulder and biceps strength.
  - Practice "bottom up" presses (photos 7-10).

- Recruit your lats.
  - Keep the weight of the kettlebell on the heel of your palm.
  - Practice "see-saw" presses. Press one kettlebell overhead while having the other in the rack position. Actively pull down the overhead KB while simultaneously pressing the racked KB. This is not an alternating press. As one comes down the other is going up, passing each other at about head height (photos 11-13).
  - Try alternating sets of clean and presses with sets of weighted pull-ups.


Photo 5

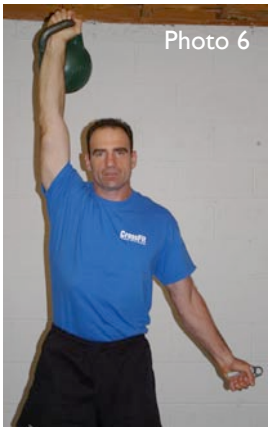


Photo 6

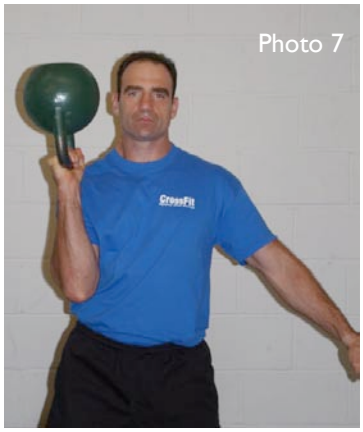


Photo 7


Photo 8


Photo 9

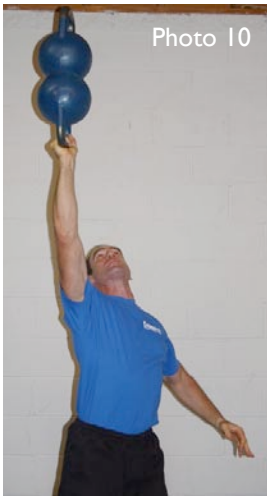


Photo 10

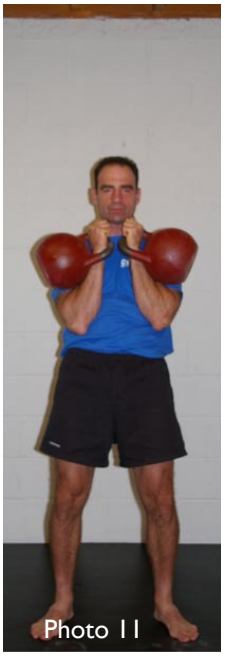


Photo 11


Photo 12


Photo 13


Photo 14

The Kettlebell Press

...continued

Assistance exercises

- Walk with one or two kettlebells pressed overhead to increase shoulder strength, flexibility, and stability.
- Practice Turkish get-ups (see CrossFit Journal issue 57 [May 2007]).
- Practice pressing two kettlebells simultaneously (photo 14).
- Practice military presses with your heels together. (It is called a military press because the feet are pressed together in the position of attention.) Be sure to press your heels and legs together to generate maximal tension in the legs. You will be amazed at the stability and strength you'll have after practicing the press this way for a while (photos 15-17).


Photo 15


Photo 16

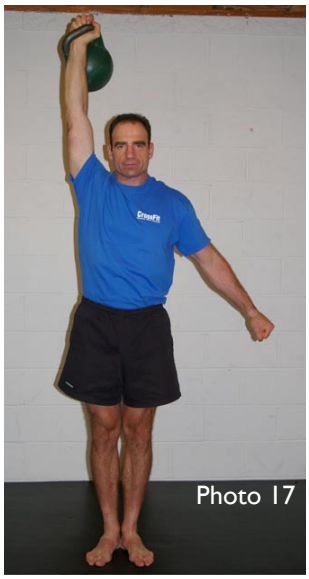


Photo 17

Sets and reps

There's no magic number or set regimen for working your kettlebell press. Do as many as you can with perfect form. If your tension is high, your reps should be low, in the range of about three to five. Multiple sets of singles or doubles are great for building pure strength.

The sport of kettlebell lifting is one of strength endurance more than pure strength, and kettlebell work is particularly good at developing your ability in this realm. While training with world kettlebell champion Valery Fedorenko, I witnessed him press the 32-kg bell for 35 reps with each arm nonstop in ten minutes. That was motivating! So, here's another approach to developing strength endurance. Let's say you can perform five reps with the biggest kettlebell in your arsenal. Set up in front of a big clock, pace yourself for the greatest number of reps you can perform in one minute; then switch hands and repeat. Learn to pause and relax in the rack position. Instantly generate maximal tension needed for the press, and then relax, pause, and repeat. In only a couple of weeks, I went from pressing the 24-kg bell 10 times per side in two minutes to doing 25 reps per side in two and a half minutes. Granted, these numbers are pathetically weak in the kettlebell sport world, but the improvement shows the effectiveness of training with time under tension.

Whichever method you choose, stay focused on the details and never compromise good form for numbers or time. May you all reach new personal bests.

Jeff Martone, owner of Tactical Athlete Training Systems, was one of the first certified senior kettlebell instructors in the United States. He is the creator of "hand-2-hand" kettlebell juggling, SHOT training, and the T.A.P.S. pull-up system and is the author of six training DVDs. He has over 15 years of experience as a full-time defensive tactics, firearms, and special-response-team instructor. He is currently teaching CrossFit's kettlebell certification seminar

Combatives Fitness

Part 2: The Workout (Video Article)

Tony Blauer

Combatives and self-defense expert Tony Blauer presents part 2 of the scenario-based conditioning lecture and demo that we left off with in the August issue.

Blauer argues that effective combat and self-defense tactics—and training—should work with the body's natural movement patterns and instinctual responses to attack and fear. Scenario-based training is all about harnessing those instincts and conditioning the mind to working under high-stress physical and mental conditions.

Part 1 talked about adapting some of the basic functional movements we're all familiar with to the tactical environment to create a warm-up designed with defensive training in mind. This month, Blauer presents a fuller scenario-based workout for training "functional fighting fitness."

Online Video Article

Video Article (10:12)

http://media.crossfit.com/cf-video/CrossFit_JournalBlauerCmbFitness2.wmv

http://media.crossfit.com/cf-video/CrossFit_JournalBlauerCmbFitness2.mov

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

Better Movements

The Jerk and Kipping Pull-up (Video Article)

Greg Glassman

CrossFit workouts emphasize high-skill movements (relative to isolation and/or machine-based movements) because they are, in almost every respect, better vehicles for optimizing fitness—for achieving CrossFit's mission of increasing work capacity across broad time and modal domains.

In this lecture from a recent CrossFit certification seminar, Greg Glassman looks at the differences among the shoulder press, push press, and push jerk and compares them to the differences between strict and kipping pull-ups. The advantage of the "better" (more dynamic) movements, he explains, lies in the power they express. They are consistently farther along the almost every continuum that matters: athleticism, power, intensity, skill, and utility.

Online Video Article

Video Article (14:24)

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

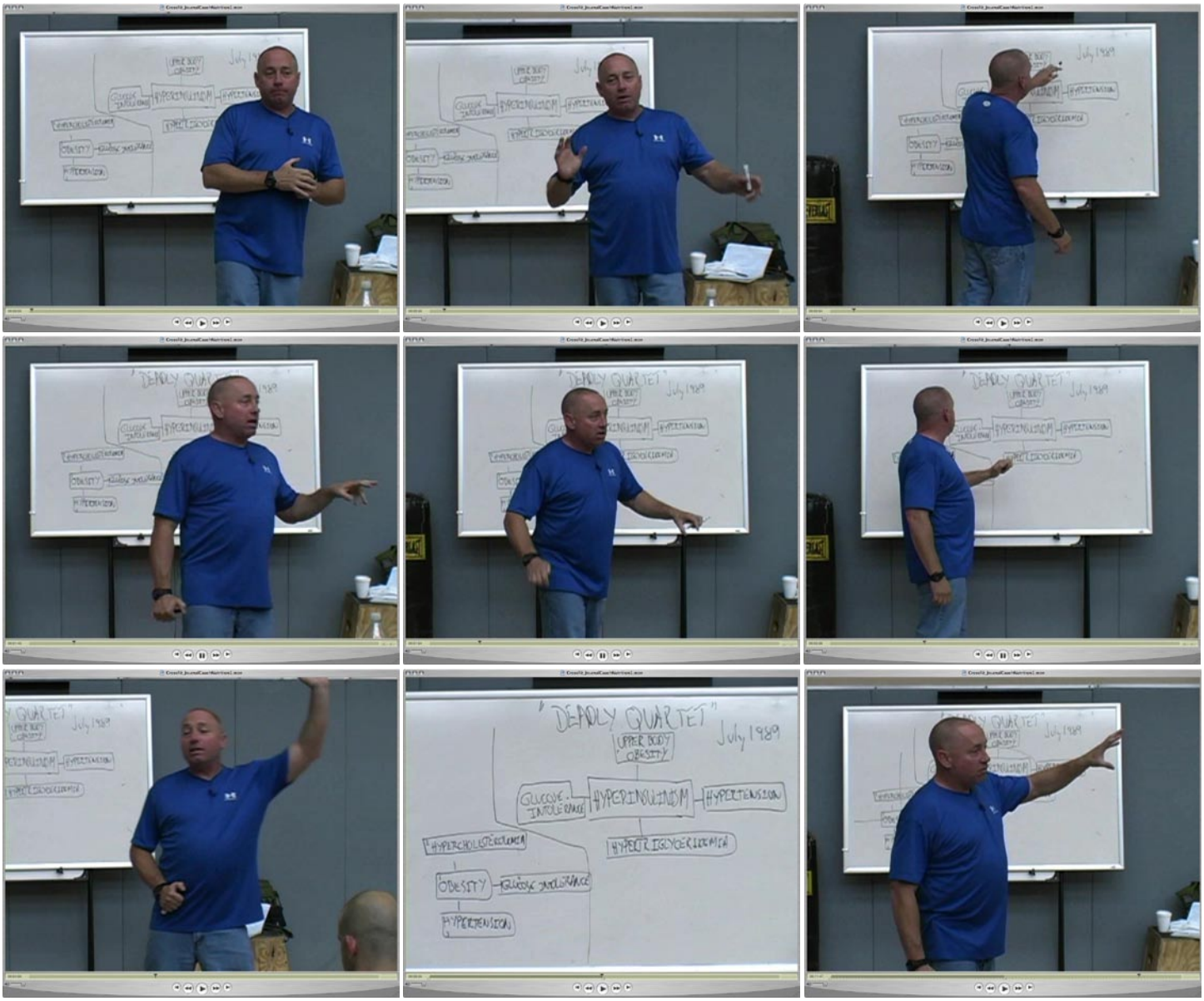
http://media.crossfit.com/cf-video/CrossFit_JournalCoachBetterMovements.mov

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

Nutrition Lecture

Part 1: Avoiding Disease (Video Article)

Greg Glassman



Nutrition can be a touchy topic, like politics or religion, that people take very personally, but good nutrition is the foundation not only for general health but also for high-performance fitness. Much of the public information about diet, particularly the emphasis on low fat and high carbs, has resulted in a near epidemic of obesity and type II diabetes. In this first of a two-part lecture excerpt, Coach Glassman explores some of the science behind nutrition and the body, particularly the role of insulin in health and disease. "Syndrome X," the "deadly quartet" (obesity, glucose intolerance, high blood pressure, high triglycerides), and coronary heart disease, he claims, are avoidable through dietary means.

Part 2 will address the refined dietary needs of the athlete and what's required to optimize performance.

Online Video Article

Video Article (14:23)

http://media.crossfit.com/cf-video/CrossFit_JournalCoachNutrition1.wmv

http://media.crossfit.com/cf-video/CrossFit_JournalCoachNutrition1.mov

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

Specifically Speaking

Lon Kilgore

Every single kind of exercise researcher and practitioner known to mankind has been indoctrinated with the concept of specificity of training. The idea is so well entrenched in the professional psyche that it even has an acronym, the S.A.I.D. principle—Specific Adaptation to Imposed Demand. In a lot of ways, it's pretty correct physiologically. We all remember Dr. Hans Selye and his General Adaptation Syndrome model, which explains how the body becomes stronger and fitter by adapting in response to physical stress. The S.A.I.D. principle fits nicely into that model. Training anaerobic exercise at the very edge of one's physical limits causes the body to adapt in a way that pushes out that boundary and increases the body's capacity for that kind of work. We believe this and we use this concept in exercise programming. Specificity does work.

Let's go a little further in our consideration of specificity though. Lots of coaches and trainers want to make their programs as specific to a trainee's sport or task as possible. To some extent, this is a physiologically sound idea. We wouldn't approach training a 100-meter sprinter the same way we would approach training a marathoner, since one relies on muscle contractile speed and stored and rapidly recycled adenosine triphosphate (ATP) and creatine phosphate for performance while the other relies on several metabolic pathways, carbohydrate availability, and cardiorespiratory efficiency. The training for a certain activity must place the same types of physiologic and metabolic demands on the trainee. That principle applies to strength training for performance enhancement as well. We use multi-joint and balance-requiring exercises instead of a collection of leg extensions, leg curls, and other machine-tracked single-joint exercises because sporting systems starts with the ground and require the body to act in a plane(s) of motion dictated by the activity, not by a machine. In this sense, a certain amount of specificity of exercise mode is also a good idea.

But specificity gets carried too far on more occasions than I can enumerate and taken to the point of being wrong. This happens particularly often in the range of exercises that particular athletes train. Some typical approaches to training for Olympic lifting and competitive cycling provide clear examples of what I mean.

If you were to go to many Olympic lifting gyms and ask the athletes there to list their exercise menu, you'd probably be surprised—or maybe not—at the narrowness of the exercises included. Snatch, snatch pull, clean, clean pull, Romanian deadlift (RDL), jerk, push jerk, Olympic (high-bar) back squat, and front squat. In extreme cases, you'll even find those who only snatch, clean, jerk, and Olympic squat. A very narrow but physically similar—thus specific—exercise selection. Progress is possible this way with beginners and, to some extent, with intermediates, since the overload possibilities offered by the partial movements (pulls, RDLs, and squats) will produce some progress. But with advanced lifters, those who focus on high-performance weightlifting competition, such finite specificity may limit progress. A standard deadlift is more of a strength stimulus than an RDL or a pull. Rising from a snatch or from a clean is more closely mimicked by the Olympic and front squats. However, the less-specific low-bar squat more efficiently develops the hips than the other two variants by anatomic function and by virtue of being able to handle more weight throughout the complete range of motion. A low-bar squat loads the hips and legs more evenly (anterior-posterior) than the quadriceps-dominant high-bar Olympic or front squats. The heavier weights possible with this exercise provide a better overload stimulus than an Olympic squat. The hips help the weightlifter stand up and help with the pull. More hip strength equates to better performance.

At some point, training exactly the performance activity or a very close variant is too specific and will fail to satisfactorily disrupt homeostasis and fail to drive adaptation.

Evidence that low-bar squatting can be effective in developing a weightlifter can be seen in the fact that a number of accomplished powerlifters who were at the national and world level made rapid transitions to the elite levels of weightlifting with little, if any, specific high-bar squat work. America's best superheavyweight of recent times, Shane Hamman, was a 1008-pound low-bar squatter immediately prior to his conversion from powerlifting to the Olympic sport. There are numerous examples of this same phenomenon occurring on a smaller scale in my area of Texas where high school champion powerlifters make national junior weightlifting teams in a matter of months after first beginning to train the Olympic lifts. The relative ease with which powerlifters can be converted to high-level weightlifters indicates that strength is more specific to weightlifting performance than squat style is, and the most efficient means of developing that strength is always best for weightlifters. At some point, training exactly the performance activity or a very close variant is too specific and will fail to be satisfactorily disruptive of homeostasis and fail to drive adaptation. In this context, too much specificity—or the wrong kind—will limit fitness gain and is wrong. For weightlifters, strength training specifically to get strong is more beneficial than strength training that tries to mimic their sport's movements more specifically.

Specifically Speaking

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Another example of specificity gone awry can be found in the sport of cycling. Cyclists just love to ride bikes, and I am always surprised by the passion of even the most ordinary recreational racer. I am also surprised at the exercise prescriptions that cycling coaches, even the elite ones, provide to develop their athletes' fitness and performance. You want to improve endurance? Ride a bike, they say. You want to get fast? Ride a bike. You want to get strong? Ride a bike. But can one activity really provide such a breadth of results? Why is the prescription for performance enhancement on a bike almost always "ride a bike more"? A huge number of trainees and coaches believe that improving on-the-bike endurance, strength, or speed is best developed by specifically riding longer, riding harder, or pedaling faster. (Remarkably, I have even been told that two hours of long, slow distance (LSD) riding will improve cycling speed performance.) OK, if you are a beginner, this approach will work, for a period of time. But if you have been riding and racing for a while, you have to alter the stress to elicit further adaptation from the body.

Endurance comes with more hours in the saddle? No. Just spending more hours pedaling away at a constant pace will fail to disrupt oxygen homeostasis and cannot drive further cardiovascular adaptation. Strength comes from pedaling a big chain ring and a little rear cog? No. At some point the physics of the chain ring size or the incline grade needed to tax strength will render the activity untenable. Speed comes with trying to pedal a little chain ring as fast as possible? No. Spinning the pedals as fast as you can will eventually reach its absolute and will be limited in its ability to stimulate neural adaptation. And don't even get me started on the mutant logic used to argue that LSD improves speed. So it appears that riding only a bike to specifically train for cycling performance in anyone other than a beginner fails the litmus test of specificity. The activity is so specific that overload is not possible. And without overload, there cannot be any adaptation in fitness or performance, so specificity in this context is a wrong approach as well. CrossFit-style broad, functional training could really help these athletes with their physical preparation.

Here is where things get a little difficult. How does specificity play into the CrossFit model of varied training? Well let's ask ourselves what CrossFit is specific to? Hard question, isn't it, since its explicit aim is broad, inclusive general physical preparedness based on intentional variety? So many diverse groups use the program successfully that you really can't pick a single specific best fit. It is tempting to say that every fitness seeker, every worker, every athlete—heck, every human—can reach their goals through CrossFit. The results of CrossFitters everywhere point to exemplary strength, endurance, mobility, and health. But we can't claim that CrossFit replaces sport-specific training. At the advanced and elite levels, most sports require extended periods of very narrowly focused training, a focus and specificity that by necessity excludes CrossFit training and its emphasis on breadth and variety.

Eva Twardokens

Let's look at the Basic Strength Standards that Mark Rippetoe and I developed to illustrate the point. In order to move forward as quickly as possible in developing pure strength, any advanced or elite trainee would need to spend a majority, if not all, of their training time on strength training. This does not mean that a CrossFitter cannot reach maximal strength potential using CrossFit methods. After all, strength is one of the basic fitness elements. But, because CrossFit training is multifocal, not singular, it will take longer to get to that peak strength performance level. The amazing Eva Twardokens is an excellent example of what can be achieved with consistent long-term CrossFit training. She got very strong on CrossFit (as attested to by her performance in numerous demo videos on CrossFit.com over the years). She was strong enough that it was observed that she would do well in competitive

Specifically Speaking

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weightlifting with her CrossFit-derived strength and skill. But Eva is a fierce competitor, and merely doing well was not an option; she would want to win. So she spent a few months training just the Olympic lifts in order to develop the specific strength and technique needed to win, not just place or show. And the result of that specific training was rapid improvement. Her 2007 U.S. National Masters Championship winning lifts rank her as either the best or second-best masters woman 63-kg lifter in the world in the past five years. This is a very good result for a few months of specific training. Solid broad-based functional fitness—true general physical preparedness—provides an unmatchable base on which to build sport-specific mastery.

Too much specificity—or the wrong kind—will limit fitness gain.

Critics of broad fitness training for specialized athletes might try to use this same anecdote to argue, on the other side of the coin, that it demonstrates a failure to improve a single specific component of fitness as fast as physiologically possible. But I think not. We all know that specificity has its costs. When focusing on just one aspect, broad-spectrum ability will suffer. If we train only for LSD, strength, power, and agility will diminish. If we train only for strength, the endurance and mobility aspects of fitness will decay. (For example, Eva's ability to reproduce her performances at the full range of CrossFit workouts suffered during her period of specific training for weightlifting.) So it is not a question of whether a specific or multifocal training approach is better; it is a question of goals and the timing of those goals. Traditionally, athletes tend to choose one thing to do well at, a sport in which to specialize. I was one of those narrowly focused competitors and coaches, and I still struggle with pushing outside the narrow comfort of my life playing with the iron. I like being strong and I like strong people. But maybe I'm getting old, or maybe working on understanding the CrossFit performance puzzle has changed me, but these days I see that we all have a lifetime in which to achieve great things and one of the greatest things is to be fit. What impresses me about Eva is not how strong she is; it's how insanely fit she is and the sheer diversity of physical tasks and activities that her training has prepared her to be able to do very very well.

CrossFitters are on a quest to be fit. Some also have more specific goals they want to achieve, and many CrossFit trainers work with clients who have competitive sporting goals. Questions on how to integrate CrossFit training into sport- or goal-specific training are common. This is a difficult topic with many divergent opinions. When the question is posed to me, I try to give the best answer I can given the circumstances of each individual who asks. There are instances where the rate of improvement for a specific component of fitness needs to be faster than CrossFit programming "as written" will provide. Detractors sometimes seize those exceptions as an argument against CrossFit's applicability to sport. I think the better response is simply that CrossFit is specific to broad physical fitness—to development of far-reaching, usable strength, power, endurance, mobility, and health. It is the best way to train for any sport, job, or goal that requires comprehensive fitness and general physical preparedness. It is also perfect for any coach who wants to rapidly establish an athlete's fitness base before adding in or moving on to specific sport training. Karoliina Lundahl, a two-time world weightlifting champion from Finland, once told me that her success in lifting stemmed from her coach's development of the athlete in her first, before he made her a competitor. His establishment of a physical fitness base early in her career allowed her to later work harder in her sport-specific work and led to her to the pinnacle of sporting success. Hers was a thinking coach who used the right tool at the right time to achieve his trainee's specific goals … and we can all do that.

Lon Kilgore, Ph.D., is associate professor of kinesiology at Midwestern State University, where he teaches exercise physiology and anatomy. He has extensive experience as weightlifter himself, and he has worked as coach and sports science consultant with athletes from rank novices to collegiate athletes, professionals, and Olympians. He is coauthor of the books *Starting Strength: A Simple and Practical Guide for Coaching Beginners*, *Practical Programming for Strength Training*, and the new second edition of *Starting Strength*, subtitled *Basic Barbell Training*.

Fixing Loopy Lifts

Mike Burgener, with Tony Budding

Photo 1A

Photo 1B

Continuing our series on the Olympic lifts, we focus this month on addressing a common problem for many CrossFitters: looping and floating under the bar. All three lifts—the snatch, the clean, and the jerk—must be fast, explosive, aggressive movements. Success in these movements requires the attitude of a junkyard dog. Unfortunately, we see too many CrossFitters pulling aggressively off the ground only to get passive in the pull-under (or drive-under, in the case of the jerk) and when they receive the barbell.

The problem

What is slow, loopy movement? It's movement that at first glance appears correct in its technical execution. It is in fact triple extension. It is in fact a jump, as we have taught. But what it is not is aggressive. It is a slow change of direction. Remember that what we are after is a vicious jump against the ground that creates momentum and elevation on the barbell. When that bar moves up to its final height, at that exact moment, the body immediately reverses direction and the arms start pulling the body down under the bar in the snatch and clean, and driving the body down in the jerk.

CrossFitters can sometimes get away with slow, loopy movement because they often work high reps with relatively low weights. They pull the barbell hard and then take their time going down, often getting too much height off the ground and not moving their feet fast enough. This is not an efficient way to lift, and it creates a bad habit that is hard to break when speed and aggression are needed. Max loads can never be successfully lifted with slow, loopy movement. With heavy weights, the window of opportunity for getting under the bar is extremely small and

Online Video — Video 1

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

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

Online Video — Video 2

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

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

Fixing Loopy Lifts

...continued


Photo 2A


Photo 2B

you must move fast. You also need the bar travel in an efficient and controlled path, but a loopy lift typically results in the barbell crashing onto the body. Slow movement will result in not getting under in time, and crashing often creates enough instability to result in a missed lift.

Annie demonstrates this passive, loopy movement in video 1. You can see the difference in photos 1A and 1B as well, which show a floaty, loopy clean and a tight, aggressive one, respectively. In photo 1A, the barbell is way too far out in front and above the shoulders of the lifter, and her body is fairly relaxed. At no point in any Olympic lift should there be either distance or relaxation. In contrast, in Photo 1B, the lifter receives the barbell at its apex by aggressively pulling her body to the bar. You can see extreme tension in Annie's body as she receives the barbell.

In the jerk pictures above, photo 2A shows a position that should never be. Here, Annie is well off the ground with her hips and legs extended and the barbell far in front of her face. In contrast, Megan demonstrates a tight, aggressive jerk in photo 2B. Her hips and arms are in almost exactly the same point in the jerk as Annie's, but her feet are just far enough off the ground to move quickly to the split position. The bar has passed just in front of her face, and she is aggressively pushing her body down with her arms against the weight of the barbell.

Video 2 gives a detailed look at the difference between loopy and proper movement in all three lifts. Listen, too, for the sound of Annie's feet hitting the ground, and how fast it is in the well-executed tight lifts.

Online Video — Video 3
http://media.crossfit.com/cf-video/CrossFit_JournalBurgOctAlternating.wmv
http://media.crossfit.com/cf-video/CrossFit_JournalBurgOctAlternating.mov

Online Video — Video 4
http://media.crossfit.com/cf-video/CrossFit_JournalBurgOctTight.wmv
http://media.crossfit.com/cf-video/CrossFit_JournalBurgOctTight.mov

Fixing Loopy Lifts

...continued

Remedies

Fortunately, there is an effective solution for going from the loopy, passive movement to the tight, aggressive movement (one for each exercise): work tall snatches, tall cleans, and tall jerks. These have been described in detail previous articles, but their essence is that they eliminate all momentum from the pull or drive so that the athlete has to move with lightning speed and extreme aggression to get under the bar. They are all demonstrated in video 3.

In the tall snatch, the athlete uses the snatch grip to hold the bar at the high-hang position at full extension—meaning standing tall with the hips and knees extended and up on the toes (or flat-footed, depending on your perspective on triple extension). The only part of the body that can generate force or movement is the traps. The athlete violently shrugs the shoulders up to create elevation and a bit of momentum (speed) on the bar and then pulls the body down under the bar into the overhead squat position. Finish the lift by standing up from the squat with the bar extended overhead.

In the tall clean, the same principles apply. The athlete uses a clean grip while holding the bar at the high-hang at full extension. Creating movement with the traps causes elevation on the bar and a bit of speed. The athlete violently pulls the body down under the bar, racking the bar into the front squat position, and then finishing by standing.

To do a tall jerk, the athlete presses the bar to a position just above the forehead while rising onto the balls of the feet. With no dip of the knees or hips, the athlete initiates the movement with a violent drive with the arms driving their body down into the split position.

In all three movements, the athlete must engage the arms in the pull-under of the snatch and clean and the push-under of the jerk. One must learn how to engage the arms at the correct time in order to get the aggressive speed required to be a junkyard dog! Examples of proper attitude and aggression can be seen in video 4.

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

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

Striking from Side Control

Becca Borawski

There are three domains of fighting in mixed martial arts: fighting on the feet, fighting on the ground, and the transition between the two. Fighting on the feet includes moves and strategies from many different striking arts, such as kickboxing and Muay Thai. To take the fight from the feet to the ground, a fighter must be versed in arts such as wrestling and judo. Once on the ground, there are myriad techniques available to the fighter, from those of jiu-jitsu and wrestling to the infamous style of striking known as "ground and pound." Fighting on the ground is the ultimate combination of the striking and the grappling worlds.

Jiu-jitsu and submission wrestling strategy is drastically changed when striking is thrown into the mix. This is not a bad thing for fighters with those backgrounds, however, as a fighter with a command of wrestling will know how to achieve and maintain controlling positions, or what is referred to as "good positioning." From a good position, a fighter can capitalize on his ability to minimize an opponent's movement and his own ability to land strikes.

This month Traver Boehm will demonstrate two on-the-ground striking techniques, executed from side control. Traver is a professional MMA fighter whose specialty is fighting on the ground.

Side control

To execute both moves, Traver will first successfully achieve side control on his opponent.

Photo 1 shows Traver's right arm around the neck and right arm of his opponent, Andy. Traver's shoulder and upper body are pressing down into Andy to hold him down, and Traver's left elbow is pressed into Andy's hip to keep him from moving to the side. On the other side, Traver's right knee is jammed up against Andy's shoulder, and his left hip is dropped down, pinning Andy and preventing him from generating any power from the hips (photo 2).

Photo 1

Photo 2

Striking from Side Control

...continued

Technique #1 - Knee strike

The first technique that Traver will demonstrate on his opponent, Andy, is a simple knee strike.

Traver will begin in side control and then move to the modified position shown in photo 3. His lower body maintains the same position, but his right arm no longer traps Andy's head. His weight is pressing down on Andy, but he is not loading all of his weight too far forward. This does two things: it keeps Andy's power source, his hips, trapped, and it also keeps Traver balanced and safe from being flipped.

Traver draws back his right leg, extending his hip (photo 4). This leaves Andy's entire left side open to strikes. Traver can then quickly and forcefully flex his hip and direct his knee into Andy's torso (photo 5). This is a common move and can be very painful to the opponent. In fights where kneeing to the head is allowed, the knee can be aimed at either the body or the head.

If Andy chooses to protect his side with his arm, therefore exposing his head, he opens himself up to strikes from Traver's right hand and elbow.

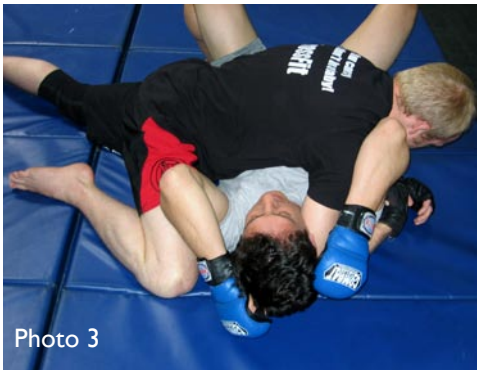


Photo 3

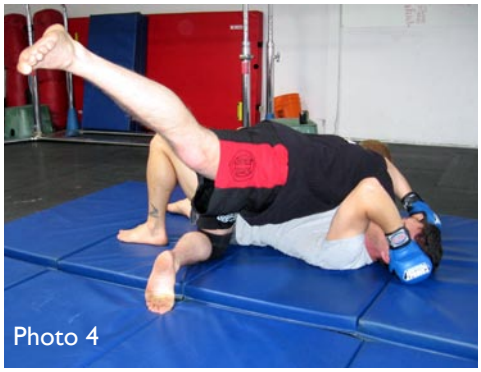


Photo 4


Photo 5

Technique #2 - Crucifix

To maneuver into a crucifix, Traver first releases his arm from around Andy's neck and presses his palm against Andy's right elbow (photo 6). Andy will try to keep his arms in position, but Traver has the advantage in this situation since he can put his weight behind his movements. Traver pushes Andy's arm out to the side and moves his right hand down to grasp Andy's wrist, holding it to the ground (photo 7). Traver then brings his left hand in underneath Andy's arm.

Next, Traver's hands will trade positions—his left hand will grasp Andy's wrist, freeing his right hand (photo 8).

Traver has now achieved a great deal of control over Andy's right arm. His weight assists him in pinning down Andy's arm, and the angle of Andy's arm makes it very difficult for him to counter.

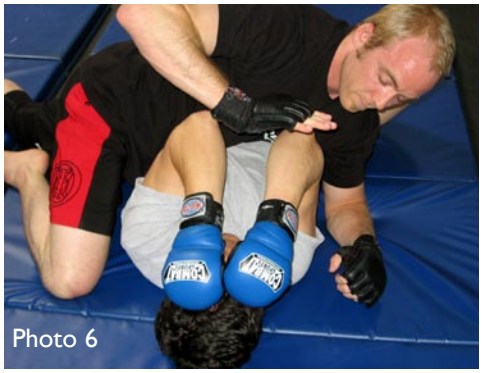


Photo 6

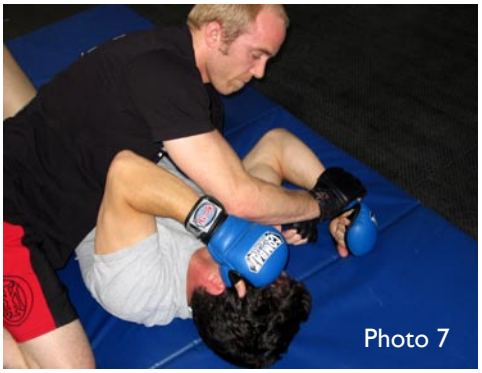


Photo 7


Photo 8

Striking from Side Control

...continued

Technique #2 - Crucifix *...continued*

Traver will then use his right elbow to clean Andy's left arm away from his defensive position, where he has been using it to protect his head (photo 9).

Grasping Andy's left wrist with his right hand, Traver will pull Andy's arm away and give himself room to push his knee through, over Andy's armpit (photo 10). Traver will trap Andy's left arm with his leg, his leg being far stronger and heavier than Andy's arm (photo 11). At this point, Traver has successfully pinned Andy to the ground, with both his arms trapped and his head and upper body exposed.

Meanwhile Traver's left hand is free to throw strikes at Andy's unprotected head (photos 12 and 13).

This technique is a favorite of many wrestlers in the UFC (Ultimate Fighting Championship). Randy Couture and Matt Lindland have both successfully used this move, and, most recently, Matt Hughes defeated BJ Penn after immobilizing him in a very similar position at UFC 63.


Photo 9


Photo 10


Photo 11


Photo 12


Photo 13

Traver Boehm is a professional MMA fighter who also trains at Petranek Fitness. He recently fought and won at the Total Alliance Fighting show in Santa Monica. When he's not beating people up, Traver studies how to fix people through acupuncture.

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

Variable Resistance

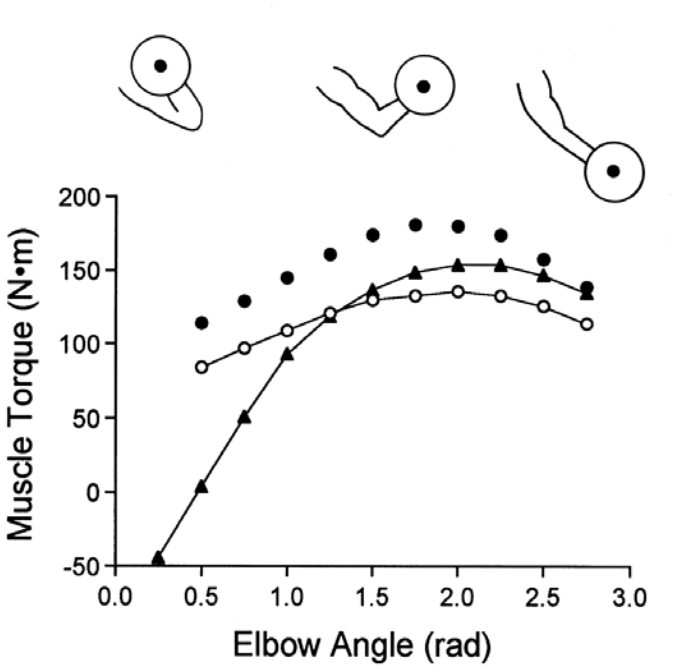
Nature or Design?

Tony Leyland

Continuing with my theme of muscle mechanics (following my article two months ago on the stretch-shortening cycle), this month I would like to explain the rationale behind the plethora of variable resistance machines and training concepts that are so common. It isn't that designers of exercise machines and fitness programs do not understand muscle mechanics (although some clearly don't), but that knowledge is often applied in ineffective and/or illogical ways.

Take the torque production from a muscle-joint complex for example. As your limbs rotate, the line of action of the muscle force changes, as does the force a muscle can exert at varying lengths, and this results in changes in torque production. Torque is a simple concept that everyone inherently understands. Nobody tries to get out of room by pushing close to the hinge of a door as we all realize that a smaller force applied farther from the axis of rotation will get the job done (over at the handle!). This is torque: mathematically it is force multiplied by the perpendicular distance to the axis of rotation. When working with free weights you learn this fast: keep the weight close to your body—i.e., as close as possible to both the joint's axis of rotation and to the body's center of gravity—and despite the obvious fact that the weight is the same, the torque will be lower and the load will feel more manageable.

We can easily measure the torque at various degrees of a flexion of a given joint. The diagram below shows graphs the torque produced throughout a biceps curl. The black dots (not connected) show the maximal torque output of this subject's elbow flexors at each position (the position of the curl is shown above graph). The dark triangles show the torque produced when curling a barbell, and the open circles show the torque produced when curling on a Nautilus cable machine. Clearly, the Nautilus curl requires much more consistent application of force throughout the range motion, whereas the torque required for the barbell falls of dramatically once the elbow flexes past ninety degrees.



From Enoka, R.M. Neuromechanics of Human Movement, 3rd ed. 2002 (redrawn from Smith, 1982). Note that the graph reads from right to left for tracing the actual movement in time of the biceps curl. (One Newton meter, the unit of measure for torque in this graph, is the equivalent to 0.75 pound-force feet, and one radian is equal to 57.3 degrees.)

Variable resistance principles

Why the difference? Well, the Nautilus machine is a variable resistance machine. You will probably have seen many of these machines dotted around your local globo gyms. They are often cable machines and you can identify them by the odd-shaped pulleys (cams). The diagram below shows the principle by which these machines they work. In the starting position on the left, it is relatively easy for the athlete to rotate the cam and lift the weight. This is because the 50-kg weight stack is close to the axis of rotation—the cable the weight hangs from is close to the center of the cam--and therefore requires less torque to rotate. However, as the cam rotates, it increases the perpendicular distance between the weight stack and the cam's axis of rotation, thus increasing the torque you have to exert to lift the weight and counteracting the natural decrease in torque you would experience with free weights. So in the diagram on the right you would require more muscular force to lift the same weight.

This wonderful piece of knowledge about muscle-joint mechanics means we can design a machine to force a muscle to work harder throughout the entire range of motion, doesn't it? That is the idea behind variable resistance machines. But that doesn't necessarily mean they're a good or particularly useful thing. For one thing, on a cable machine, the weight is somewhere else and you're working through a cam or pulley, so you can't stabilize the weight over a joint center. But before I go further into why I don't advocate variable resistance machines, let's look at some other common variable resistance systems.

The fitness industry doesn't stop at kidney and other odd-shaped cams to achieve variable resistance. Another common machine system is isokinetic variable resistance. The term isokinetic means "constant velocity." These machines are based on viscosity and they basically will resist as hard as you push or pull. (They are also expensive and some clubs will change a premium for you to use them.) These machines have fluids (oil, water, or air) that are forced though an aperture in a cylinder when you push or pull on the bar. You set the effort (velocity) you want to work at and

Variable Resistance

...continued

then push as hard as you like throughout the range of motion. The narrower the aperture, the harder it is to force the fluid quickly through it and hence the resistance is greater and the slower you'll move the bar. Again, you will exert high forces throughout the entire range of motion. As with the variable resistance pulley machines, you haven't got a weight you can position directly above or below a joint (thus reducing the torque).

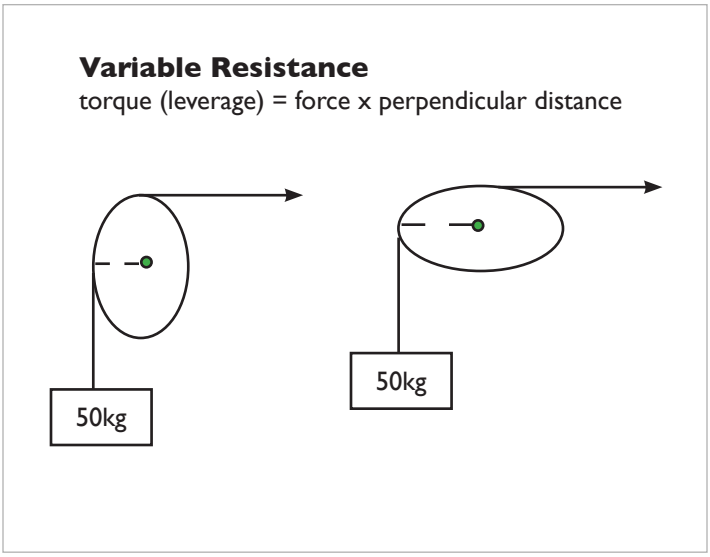
The best way for you to feel how isokinetic machines work is simply to put your hand in a bathtub or swimming pull and pull your hand slowly though the water. Now try to pull your hand through as fast as possible. The faster you try to move, the greater the resistance. Another example is to put your hand out a car window when going 30 miles per hour and do the same at 60 miles per hour. These examples show that the resistance fluids (gas and liquids) offer to your path through them is velocity dependent. Another example is to look at sports clothing. Marathon runners don't worry about smooth, tight-fitting clothing; at their speeds, wind resistance is minimal and no real advantage can be gained from having aerodynamic clothing. Downhill skiers, however, go much faster and do not want baggy clothing slowing them down.

Another less common (and less expensive) method of variable resistance is to attach heavy chains to a barbell that unfurl as the barbell is lifted farther from the floor, increasing the effective weight of the barbell as more chain is supported by it rather than resting on the floor. Admittedly this method does require you to control a free weight and therefore places demands on your coordination and additional stabilizing musculature, but I still wouldn't rush out to buy heavy chains if I were you.

People often ask about Bowflex and other spring resistance systems. They too are based on variable resistance but it works opposite to how we commonly experience resistance in the real world. When you pull against a spring, it gets harder and harder to pull the farther you stretch it. When working with barbells, kettlebells, dumbbells, rocks, jerry cans, and other real-world objects (i.e., when countering inertial resistance), the resistance will generally be reduced as you speed up the load. This also true in grappling, wrestling, tackling, etc. Once you have made a large effort to get an opponent slightly off balance they are easier to then drive completely to the ground. But working with springs is not going to effectively train you to coordinate muscle torques in a functional way. You get good at pushing springs (principle of specificity) on a machine that dictates for you the direction to push and pull. And though it is, like any form of resistance training, a lot better than just lifting the TV remote, it is not the most effective use of your time.

Do you need variable resistance?

So why am I not sold on the benefit of variable resistance machines? As I have said, the weight is somewhere else and you do not need to develop any skill to control the weight. In addition, because many of the machines work on isolated muscles you do not develop the skill to coordinate numerous muscle groups into functional patterns of contraction (including core stabilizers).



I think the fundamental problem is the conceptual separation of muscle mechanics from the neural control of the muscles (neuromechanics). While variable resistance machines do stress muscles throughout the range of motion, that is only part of what we need from strength training. As Coach Glassman puts it in "Foundations," our pursuit of optimal fitness must "strive to blur distinctions between 'cardio' and strength training. Nature has no regard for this distinction." Similarly, nature has scant regard for strength in isolation. By this I mean force production (strength) should not be separated from flexibility, coordination, accuracy and balance. Is the strongest athlete always able to lift the most? Clearly not, as is easily demonstrated when a strong athlete with poor shoulder and hip flexibility and or poor coordination attempts an overhead squat. At a fundamental level, the problem with all machines is the attempt to separate the physical skills. Variable resistance machines claim to be better because they supposedly mirror torque-angle relationships, but that doesn't solve the fundamental problem of attempting to separate muscle mechanics from neural control and the ability to use the body as a coordinated whole. The ten physical skills that we take to define fitness (cardiovascular/respiratory endurance, stamina, strength, power, flexibility, coordination, accuracy, agility, and balance) should never be viewed in isolation. And while some training will necessarily focus on one aspect more than another, there is no need to artificially separate these components (as occurs in machine-based strength/endurance work).

We must also realize that while some of the most common movements and lifts result in the resistance dropping as we complete the motion, as in the biceps curl example in the first figure. This is a natural mechanical response and not something that we should try to avoid or circumvent in training. Let me explain.

Variable Resistance

...continued

The laws of physics tell us that a body will continue in its state of rest or motion (constant velocity) in a straight line unless compelled to change that state by external forces exerted upon it. This is Newton's first law of motion, sometimes called the law of inertia. We inherently know that starting that heavy barbell moving is hard but that once we've got it moving it wants to keep going. So heavy lifts have what is called a sticking point where the amount of muscle force that can be exerted on the load (which is moving slowly and resisting changing that state) is only just able to get the weight moving. Once past that point, the weight starts to accelerate and, toward the end of the lift (even if less muscle force can be used), the lift is easier. Of course, that pesky thing called gravity is trying to slow the weight down but unless it is a really heavy weight we can get the load moving upward at a reasonable pace, and as stated, once we get it going it will be easier to keep it going. This is why you can lift more in a push press than a strict press: your much larger leg musculature gets the weight going up and you only have to use the smaller upper-body muscles to keep it moving to the finish. *This pattern of resistance is one of nature's very common forms of variable resistance.*

However, not all resistance motions we perform result in reduced torques as the load is accelerated. If the load moves farther from the joint center, the torque can increase even if the load is being accelerated. For example, in the middle part of kettlebell swing to overhead, the torque will be very high even though you already have the kettlebell moving fast (this because the load's is a full arm's length from your shoulder). So in nature if loads have to be moved from close to farther away from the body you will get, yes, variable resistance.

Working with free weights also teaches us when we really need to keep the torques as low as possible for a given weight. The gravitational line of action on a weight is always vertical, and the distance between this vertical line of action and a joint center is crucial. If, for example, you do not get a heavy press directly overhead (elbows into your ears, weight above feet) the resultant torque is going to demand much more effort from your shoulder muscles and may in fact cause you to lose balance and drop the weight. Similarly, if want to make that max deadlift, you better keep that bar on your shins, reducing the torque on your lower back. Training a multitude of movements in your workouts prepares you for a variety of real-life situations where loads can sometimes be kept close and sometimes not. The bottom line is that you don't need a machine to provide artificial variable resistance.

If you go back to the first diagram you'll see that the torque drops to zero toward the end of the curl. Well, if you take a light weight (say something around your 15-rep max) and do an explosive push press, you can get the barbell moving upward so fast that although gravity is pulling it back it'll carry on upward for a bit without much, if any, more effort from you. In fact, if you get enough momentum on it, you can let go of the barbell and the bar will continue up past your full extension height (as with wall ball, for example). In this scenario you will actually have to grip tight and stop the barbell from continuing upward. However, with much heavier weight (your one- to three-rep max, for example) you will have to push hard during the entire motion. That is why it is also beneficial to work with a wide range of loads. Varying the weight is essentially another way, along with every other natural movement, of creating variable resistance.

I will admit research has shown that variable resistance does improve strength throughout the full range of motion better than "non–variable resistance." This benefit, however, is only compared to strength training on non–variable resistance machines, and these studies tend to look at force production at the specific intensities trained (like 10-rep maximums, for example). But what about the effective application of strength? By this I mean the skill component—the development of the motor control required to effectively lift heavy weights. If we can keep the line of action of a heavy weight close to the joint center of rotation, lifting it requires less torque than lifting a lighter weight whose line of action is farther from the center of rotation. This is why, as discussed above, lifting heavy weights is not just about pure strength. Studies that suggest that variable resistance machines are a great way to train are looking at one narrow parameter—one very specific definition and isolated definition of strength—but not at the functional expression of athleticism or power in the real world.

In this article I have criticized machines in general and specifically the claim that variable resistance machines are better as they mirror the torque-angle relationship of a muscle/joint system. But the question remains: "Are they bad?" As an educator and trainer, I have to accept that someone who is doing any kind of resistance work is better off than the majority of the population. However, real-life movement and strength requirements will challenge all ten physical skills, and so should your training. If you are in the military, a first responder, or a martial artist, you don't need me to suggest machines are not an effective training tool. The bottom line on this question? If you put a CrossFitter on a variable resistance machine, they will do well. If you give a reasonably heavy barbell to someone who only trains on a machine and tell them to get it overhead, I suggest you stand clear!

Tony Leyland is Senior Lecturer in the School of Kinesiology at Simon Fraser University, Vancouver, British Columbia. He has taught at the university level for 25 years and has been heavily involved in competitive sports such as soccer, tennis, squash, and rugby as both an athlete and a coach for over 40 years. He is a professional member of the National Strength and Conditioning Association, a Canadian National B-licensed soccer coach, and a level-1 CrossFit trainer. He can be reached at leyland@sfu.ca.

Large-Group Workout Solution 2

Snatches and Squats

Michael Rutherford



Last month I received more inquires about my article than for any other article I've written for the *CrossFit Journal*. It was significant on several levels. For one thing, I enjoy discussions about dumbbell conditioning and am glad folks are finding the articles useful. It also confirmed my that CrossFit groups are expanding rapidly and that the CrossFit movement is reaching evening deeper into broad fitness circles.

The majority of people who wrote to me asked that I share some other large-group workouts that use dumbbells. As I say over and over in this column, the dumbbell is perfectly suited to the minimalist approach advocated by CrossFit. It is also ideal for both the new athlete and the seasoned veteran and is an excellent tool for those with limited funds and space.

As a refresher, I restate the Rutherford Postulate: "As the group increases in size, the complexity of the workout diminishes." Unless you have associate trainers all around you, or a group of very experienced, well trained, and skilled athletes, it is difficult to coach complicated movements and unwise (and often impractical) to orchestrate a workout that involves five, six, or seven different exercises and/or pieces of equipment.

Keeping this at the forefront, I present this month's large-group workout solution with dumbbells. This workout will share some of the characteristics of the large-group approach from last month.

We'll keep it simple with just two moves: the dumbbell hang power snatch combined with another bodyweight classic, the air squat. These are two of my favorite movements to pull from the pool of possibilities.

Single-arm dumbbell hang power snatch

The dumbbell snatch demonstrates and develops explosive athletic power (the movement is described in detail in my article in issue 54 of the *CrossFit Journal* [February 2007]). While the movement is dynamic, explosive, and can be a real barn burner, it can also be made suitable for new or less developed athletes.

I typically teach the dumbbell snatch by first introducing and drilling the muscle snatch, the slower, less dynamic precursor to the dumbbell snatch. The point here is to teach the athletes the proper path the dumbbell will travel and to begin to ingrain the movement pattern before we ramp up the speed and power (and weight). Again, this is described in the February issue.

Here are the basics of how I teach the single-arm dumbbell hang power snatch in a large group:

Large-Group Workout Solution 2

...continued

Start in the hang position, feet under your hips, standing upright and tight, with the dumbbell hanging in one straight arm just in front of your thighs. Initiate the move by a drawing in a quick breath and then flexing the hips (butt back) and dipping the knees a bit before violently extending the legs and hip upward with a quick snap, while pulling the shoulder, elbow, and then hand and dumbbell up and overhead, finishing with the weight extended above the head on an active shoulder and landing with feet and knees in the power position. Keep the weight close to your body at all times during its upward movement. Don't arc it out in front of you. And don't pussyfoot around. Get the thing overhead!

In the finishing position, the arm is fully extended, chest high, back flat, feet flat on the ground, and eyes focused on the same point as at the beginning of the movement.

Air squat

WMV The air squat is not only a lead-up to the weighted squat; it is a great exercise in its own right, and it teaches and trains the power position that virtually all athletic postures and movements build on.

Here are my "nutshell" instructions to the group for executing the squat:

Assume a stance with your feet spread shoulder-width and your weight on your heels. Now toe out slightly, up to about 30 degrees. While keeping the weight back, the chest high, and eyes fixed forward, sit back like a catcher, keeping your heels planted firmly on the ground. From this static position, think "hips" and stand up to return the legs extended position. (This video shows a controlled air squat that fits these standards.)

Have everyone practice the moves several times and make corrections as needed. In very large groups, it can be useful to pair people up and ask them to critique and coach one another for a set number of slow, controlled reps.

Putting them together

Now that you've introduced the movements, it's time to structure the challenge. Again, I like the notion of setting a challenge of how many reps or rounds each athlete can complete in, say, somewhere in the 10- to 20-minute range. This removes much of the pressure from the novice participant but allows the fire breather the chance to hammer it, and it guarantees that everyone will finish at the same time, which makes for easier group management on your part.

The workout could be written as:

> Complete as many rounds as you can in 12 minutes of:
>
> 10 dumbbell hang power snatches (5 right, 5 left)
> 15 air squats

A variation on this would be to pair people up and having one person do the squats while the other does the snatches and then switch. This is useful when you have more people than (appropriate-sized) dumbbells, and it has the advantage of motivating intra-pair cooperation and incentive as well as inter-team competition. That can up the intensity level for those who desire it and enhance the social and team aspect of group workouts.

Another possibility would be to have the athletes switch hands after each snatch rep instead of midway through the set. And yet a third way to manipulate these two movements would be to perform singles. One right-hand snatch, one left-hand snatch, followed by a squat. For an extra large crowd, you could even do it relay style for an assigned period of time.

As you consider the goals for the workout and write it to suit your group, keep in mind the undeniable inverse law of intensity to volume. You can have either more intensity or more volume—but not both. If you've practiced CrossFit for any time, you know that the results reside in the higher-intensity efforts. Now go out and conquer the masses.

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

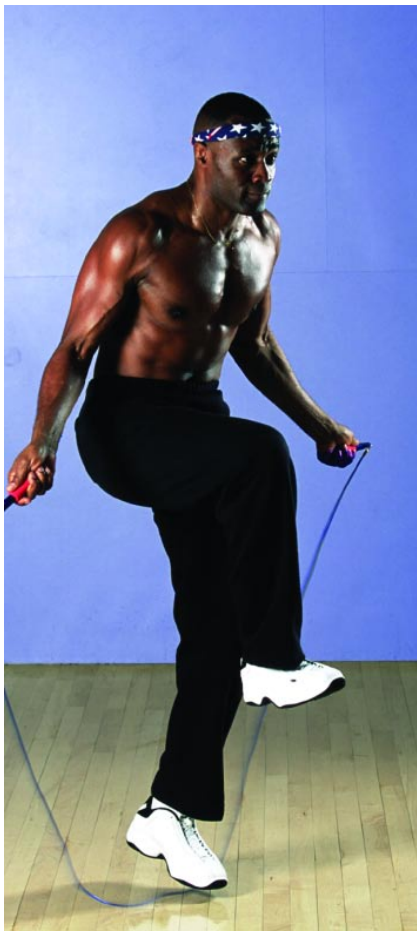
Jump Rope Basics

Part 1: Preparation

Buddy Lee

When I was training as a wrestler for the 1992 Olympic Games, the jump rope, along with many of the kinds of functional training exercises embraced by CrossFit, were the keys to my development into one the quickest, most explosive, and most highly conditioned wrestlers in the world. I believe that CrossFit's fitness principles of functionality, intensity, and variety are taking us back to the basics and setting the standards that can help our nation to regain its health. Jump rope can be an important part of fitness and sports training, providing key advantages in developing dynamic balance, speed, quickness, agility, coordination, concentration, and cardiorespiratory efficiency.

I come to you with a proven system based on twenty years of research and testing, including use with many of the world's greatest athletes. I will teach you the tools you need to master jump rope and reap its benefits. My mission is to educate, motivate, and encourage you to jump rope as an integral part of your CrossFit training.



Technique tips

1. Look straight ahead to maintain balance.
2. Keep body upright and balanced with the weight on the balls of the feet.
3. Jump only high enough to clear the rope (1 inch off the ground).
4. Land lightly on the balls of your feet.
5. Keep your elbows close to your sides, pointing down at a 45-degree angle.
6. Never sacrifice good jumping form for speed. Progress slowly.

Misconceptions about jump rope

Many people think jump rope is so simple that any rope and material will do and that instruction is not necessary. When they realize that the rope they have is one length, lacks adjustment, and does not turn smoothly, they often give up in frustration. In actuality, jump rope is a skilled movement that requires proper timing and coordination with every jump. Developing the rhythm and timing to master the skill can be difficult and intimidating for some people. These frustrations can be alleviated by proper equipment (a jump rope that is adjustable for your height, has a proper turning mechanism, and is aerodynamic) and progressive, step-by-step instruction.

Many people have shied away from jump rope because they trip every few jumps and have difficulty jumping with continuation. There is the fear of looking like a klutz. I too know this awkward feeling when trying out a new training technique, especially when I was in peak wrestling conditioning. However, my attitude has always been to not shy away, but become more determined to master the technique.

A common belief is that jump rope is high-impact and therefore hard on the knees and joints. I have even been asked if jump rope causes arthritis in the knees. (It doesn't.) Unless there is a preexisting medical issue, these are problems that can be easily avoided by learning how to jump rope the correct way. It is also important to remember that gradual progression will minimize the risk of injury. In fact, jumping ½ to ¾ inch off the floor, which is all you need for good jump roping, causes less stress on the joints than running and actually strengthens the muscles supporting the knees.

For those of you who would like to learn how to jump rope—or how to teach others—but do not know where to start, I am here as your personal jump rope training coach, to teach you step by step how to jump the right way.

Why jump rope works

When done the correct way, jump rope offers many benefits and is a building block to fitness. It reinforces natural body biomechanics, symmetry, and efficiency in movements. It is portable, requires only a small space, and provides great benefits in very little time. It can be done year round, indoors or outdoors, in a group or alone. It can be performed merely as a warm-up to quickly raise core body temperatures before athletic activities or strength training, incorporated into circuits or other workout formats, used for "active rest" periods, or done as a standalone workout in its own right. Jump rope can be used as a training tool to target both the aerobic and anaerobic energy systems.

According to research by John A. Baker (1969), ten minutes of jump rope at only a 120 turns per minute can provide the same cardiovascular benefits as thirty minutes of jogging, two sets of tennis, thirty minutes of racquetball, 720 yards of swimming, or eighteen holes of golf. The metabolic rate, or energy output, is increased when different foot patterns are integrated. Jump rope involves multijoint movements that incorporate every muscle in the body and it ranks as one of the most efficient way of shedding

Jump Rope Basics

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pounds. For the average person weighing 150 pounds, it expends as many as 12.9 calories per minute, or 770 calories per hour.

My system is based on a way of jumping that I call Hyperformance Jump Rope, which is performed in short, intense bursts at high rope speeds exceeding 220 RPM (revolutions per minute), coupled with active rest periods. This is how I trained as a world-class athlete to produce competitive advantages in speed, quickness, agility, balance, coordination and explosiveness, but it is suitable for athletes of all levels. Jump rope produces the greatest benefits when it targets fast twitch muscle fibers and the anaerobic pathway.

Jump rope requires the coordination of several muscle groups to sustain the precisely timed and rhythmic movements that are integral to the exercise. It is the coordination of these muscle groups that increases your capacity for dynamic balance—the ability to maintain equilibrium while executing complex, vigorous, and omnidirectional movements. Jump rope increases dynamic balance because you must make numerous fine neuromuscular adjustments to the imbalance introduces by each of the hundreds of jumps per training session. Balance may be one of the most important attributes for avoiding injury when performing both athletic and everyday life activities.

My four-step jump rope training system

Many people jump rope incorrectly, by jumping too high, landing too hard, using incorrect body alignment or improper rope sizes, or by jumping on the wrong surfaces. In fact when done the correct way, jump rope requires you to jump only high enough to clear the rope, about ½ to ¾ inch off the floor, and involves less impact than running. After research and working with US Olympic sports teams to produce championship results, I have developed a proven 4-step system that teaches people of all fitness levels the right way to jump to receive the greatest benefits. My system is low impact, follows a safe teaching progression, and is easy to learn.

My system was designed with four steps:

Step 1: Preparation Phase
Step 2: Intermediate Phase
Step 3: Conditioning Phase
Step 4: Sports Training Phase

The purpose of my four-step system is to teach you in a structured way how to:

- Safely improve your jump rope proficiency.
- Gradually increase your jump rope capacity to 5–10 minutes.
- Gradually increase rope speeds from 120 to 200+ RPM.
- Incorporate sports-specific training jumps.
- Provide an easy transition to my Hyperformance Jump Rope programs for additional high-intensity training.

Step 1 – Preparation Phase

This article, the first in a series, will walk you through step 1 to get you prepared with the right equipment and off to a safe start. The first step is to master the skill of jumping properly without a rope. It is important to use ropes that facilitate good control and performance, jump on surfaces that absorb impact while generating a rebound effect, and wear clothes that will not impede movement.

The rope

Today's jump rope cords are composed of a variety of materials such as leather, sash cord, rubber, vinyl or thin and heavy cable that possess different weights and have different performance characteristics. But as jump rope increasingly becomes a tool in your training, not just any rope will do.

Most jump ropes on the market are poorly designed and don't facilitate the maximum effectiveness of a jump rope workout. The main problem is that they are not adjustable to your height, which is critical to preventing drag, friction, and tangling. Another problem is poor handle design; in many cases, the handles are too big, too small, or too heavy, not fitting the ergonomics of the hand for a controlled and comfortable grip. Also the way ropes function inside the handles has a lot to do with creating excessive drag and premature breakage of the rope cord. The external swivel bearing system that my ropes feature allows for free rotation of the rope cord in all directions for maximum performance.

Here are some guidelines for choosing a rope for general conditioning purposes and to incorporate into CrossFit workouts.

1. If you are a beginner who does not yet know how to jump rope properly, start off by using a jump rope with a thicker cord. (My jump and stretch cord is for this purpose; it is adjustable and is made of a bungee material that holds a perfect arch.) A thicker cord will provide a slower cadence, which will help you learn the successful timing and coordination of the rope swing with each jump. The more continuous jumps you can sustain, the more motivated you will be and the more benefits you will be able to reap from your jump rope sessions.

2. If you can jump at least 100 times without a miss, choose a speed rope with a heavier cable. It will allow you to jump faster and with control, but it has a greater centrifugal tendency that will challenge the forearms, chest, shoulders, and abs more.

3. If you are an accomplished jumper who can perform the power (i.e., double-under) jump with ease, choose a high-performance lightweight speed rope that can be customized to your height. These ropes offer versatility for any type of jump rope training, while allowing ease in performing consecutive double-unders and advanced skills.

Jump Rope Basics

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For sport-specific training, there are a few other factors to consider. To decide whether a heavy or lightweight speed rope is best, use my motto: Train with the rope that allows you to best simulate the speed, quickness, and agility required of your sport. A lightweight aerodynamic speed rope easily responds to directional change with minimum air resistance and is effective in developing the anaerobic energy system while increasing quickness of the hands and feet. Polyvinyl chloride, or PVC, is the most versatile cord material because it can be manufactured at the proper weight, thickness, and flexibility to maximize the rope's aerodynamic properties in all directions. As a result, PVC material maximizes the number of repetitions per set that can be executed going forward, backward, and lateral. This is the type of jump rope that I used for my wrestling training and still use today.

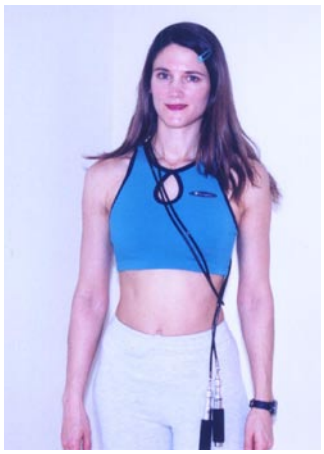
Surface and training area

The best jump rope surfaces provide rebound for the takeoff phase of each jump and sufficient absorption for the landing phase. Recommended surfaces are wood, rubber, level dirt, or, if a good surface is unavailable, I recommend investing in a jump rope training mat. Avoid jumping on hard surfaces such as concrete or tile, as it will increase the risk of lower-body injuries. Each person will need an area of sufficient clearance on the sides (five feet) and over the head (two feet) for safe jumping.

Shoes and attire

Choose a pair of cross-training shoes with ample forefoot padding, because jump rope requires bouncing and balancing your body weight on the balls of the feet. Wear loose or well fitted sports gear. Women should always invest in a good sports bra. Remove big earrings, bracelets, and jewelry that could get into the path of the rope. A rope in motion can also cause serious injury to bystanders or someone jumping in front or behind you, so watch out for your surroundings. As a beginner, you are likely to encounter frequent tangling of the rope in your arms and legs and rope whips that may leave marks, so wearing long pants can be helpful.

Rope care



To avoid kinks and to ensure a ready rope, do not wrap the rope cord around the rope handle. Store the rope in room temperature and not in a cold garage or outdoors. To keep it kink-free hang it evenly balanced over a hook or fold and lay it loosely on a flat surface or in a sports bag. Knowing how to properly store your rope can help preserve its life and ensure functionality and overall performance.

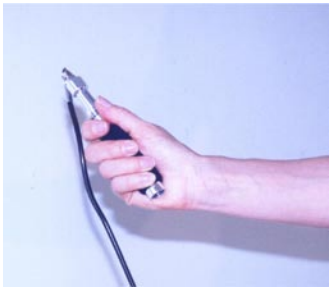
Rope measurement

A rope that is double the length from your feet to shoulders is ideal for mastering the fifteen basic jumping techniques. Provided that you have good jump rope form and posture, a rope adjusted at shoulder height will clear the head by at least ten inches during the execution of basic jump rope movements.

To determine proper rope length, stand on the center of the rope with one foot, and then pull the handles up along the side of your body so that the tip of the handles extends no higher than your shoulder. If the handles extend beyond your shoulders, the rope is too long. This will result in excessive drag through the air and on the floor and will reduce the rotational speed of the rope while increasing the frequency of catches and tangles. It will reduce continuous duration, even for lightweight speed ropes. If the rope excessively smacks the surface with each pass or clears your head by more than a foot, it is probably too long and should be shortened. However, the standard length is a guideline, not an exact measurement for all individuals, and you might find that you perform best with a rope slightly longer or shorter than this guideline would indicate.

As you become better conditioned and more proficient at jumping, shortening the rope can help produce even greater benefits. A shorter rope leaves little room for error and forces the hands and feet to move faster, dramatically increasing rotational speeds. It will also increase whole-body awareness and develop and lightning-fast reflexes.

Body position and grip



Stand upright with your head positioned squarely on your shoulders, focusing straight ahead. Grasp the handle with a comfortable grip. When you turn the rope, make two-inch circles with the wrists. Keep your arms close to your sides, with forearms at a 45-degree angle at waist level.

Shadow jumping

Shadow jumping is a simulation of jump rope, without the rope. It is the first step in learning proper jump rope technique and helps teach you how to jump less than an inch from the jumping surface

Jump Rope Basics

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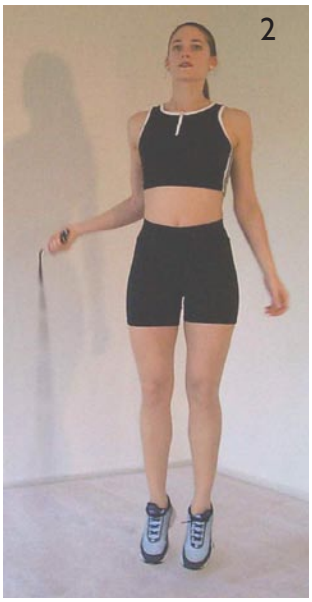

and land lightly on the balls of the feet. This is the progression you will use to learn and practice both of the jump styles described in the following section (the basic bounce step on both feet and the alternate-foot step).

Now let's get ready to prepare the mind and body to perform the perfect jump.

1. First practice the take-off and landing phase of jump rope without the rope, while making small circular movements with the wrists. Stand upright and bounce lightly and evenly on the balls of your feet, simulating the movement of a boxer bounce, no more than one inch from the surface. Keep your arms close to your sides and make small circles with your wrists. Keep your head square on your shoulders and look straight ahead. Bounce back and forth, moving in all planes—forward, backward, and lateral—until you can barely hear your feet making contact with the surface.

2. The next step is to jump as in step 1 while holding both handles of the rope in one hand and swinging the rope in a forward circle out to the side of the body, in a windmill motion, in time and rhythm with each jump.

3. Introduce the rope into the jump by getting into the starting position with the rope resting behind the knees. From there, practice swinging it forward in a nice even arc over the body.

Rehearse these movements to develop muscle memory and timing. Simulate first the basic bounce step for one minute and then the alternate-foot step for one minute. All jump rope skills can be learned from this progression.

The two basic techniques

During the preparation phase you must first master the two basic skills, the basic bounce step and the alternate-foot step, before learning other training techniques. In the first two weeks, the emphasis should be on technique, not speed. Practice the basic bounce step and alternate-foot step up to a total of 5 to10 minutes twice a day. Depending on your current skill level, begin with as few as 1 to 5 or 5 to 25 jumps per jumping bout. Jump and rest in a 1:2 ratio (e.g., jump 30 seconds, rest 60 seconds). As your technique and jumping capacity improves, add 10 to 20 jumps to each jumping bout and shift your jump to rest ratio closer to 1:1 (e.g., jump 60 seconds, rest 60 seconds). By the end of the second week, you should be able to jump 120 to140 times without a miss. Remember to focus on skill and continuous jumping while you are progressing at a comfortable rope speed. Stretch after each session, calves especially!

The *bounce step* and *alternate-foot step* are two basic jump rope techniques that will provide the foundation for the rest of your jump rope training. In addition, these techniques will improve your conditioning level, reinforce proper jump rope form and create the muscle memory necessary to master the foot patterns of other basic training techniques.

Bounce step

The bounce step is simple and effective. Time the swing of the rope while jumping with both feet. When turning the rope, make small circular movements and let the wrists do most of the work, keep body erect and look straight ahead. Jump only high enough to clear the rope. Start at a natural jump rope speed until the fundamental motor pattern becomes automatic. Remember, practice improves the coordination and speed of the rope swing with every jump.

1. Jump approximately 1 inch from the surface, or just high enough to clear rope.

2. Land lightly on the balls of your feet.

3. Do not let heels touch the ground on landing. Stay up on the balls of your feet and reload to repeat steps 1 and 2.

Jump Rope Basics

...continued

Begin with just one jump and swing at a time to establish timing and rhythm for the perfect jump and landing. Then increase by five jumps per set. As you get more proficient, keep adding jumps per set until you can eventually perform 140 jumps without a miss. Master the bounce step before attempting the alternate-foot step.

Alternate-foot step

The alternate-foot step is to the bounce step, except that, instead of jumping with both feet at once, you alternate feet, as if running in place. Jump a little higher than an inch from the surface. Start off by performing this jump without the rope; just practice alternating feet in place, using high knee action but staying on the balls of your feet. Next hold both handles on one hand and turn the rope out to the side of body in sync with your feet while alternating them; left, right, left, right. Jump by raising the knees to the front. Be careful to not kick your feet backward or behind you, as they will catch on the rope.

Finally, combine the rope swing with the jump. From the starting position, rest the rope behind your knees, with your right knee up. After jumping over the rope with the left foot, be sure to wait for the rope to pass over your head before jumping over it again with the right foot. Repeat this cycle only twice (left, right) until you master it; then work to repeat it four times (left, right, left, right), once you can do that consistently, then begin to work on continuation. Continue alternating feet (lifting knees as if jogging in place) at a slow pace until you establish a comfortable jumping rhythm.

Online Video — Introduction to Jump Rope

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

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

Online Video — Fixing the Basic Bounce

http://media.crossfit.com/cf-video/CrossFit_BuddyLeeBounceFix1.wmv

http://media.crossfit.com/cf-video/CrossFit_BuddyLeeBounceFix1.mov

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.

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