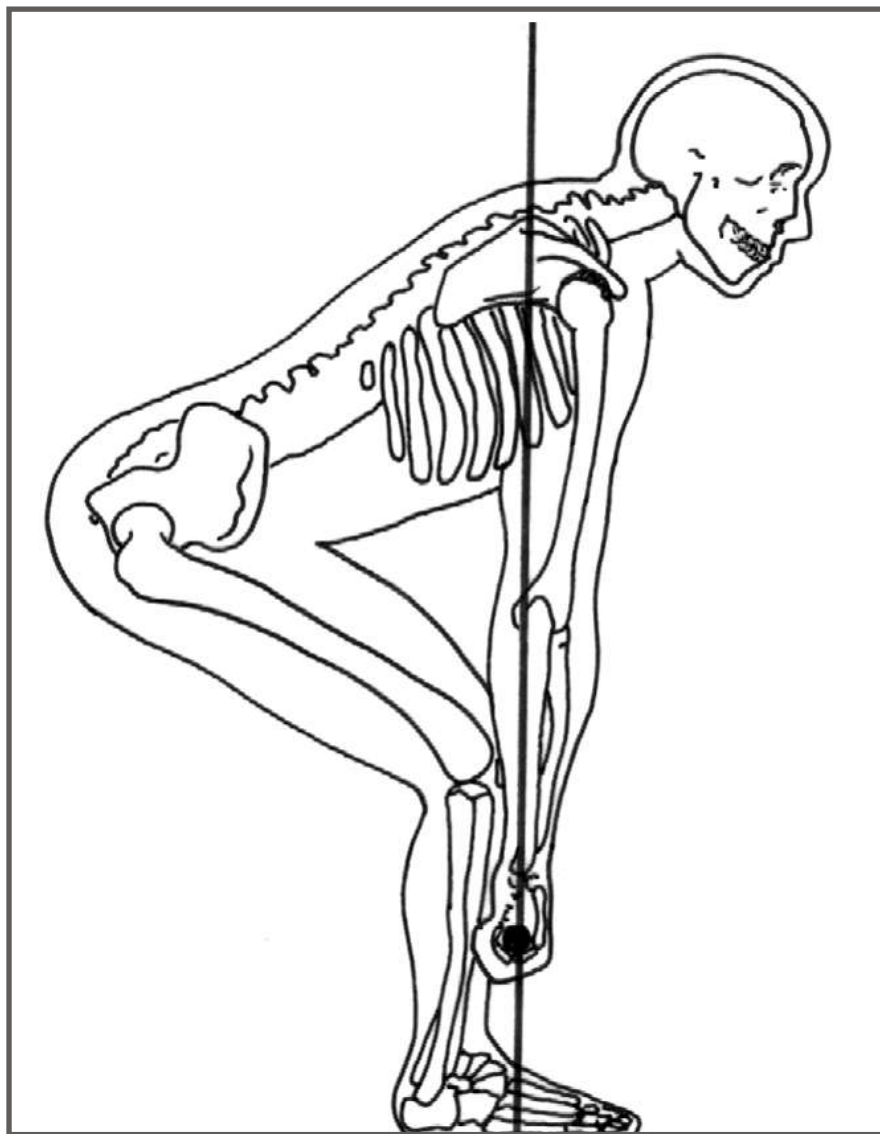


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A New, Rather Long Analysis of the Deadlift

— Mark Rippetoe —

Proper deadlifting technique is that which allows the most weight to be lifted. This rather straightforward observation is true because the mechanics that permit an efficient heavy deadlift are the same for all weights, light or heavy. Why would 500 pounds be pulled one way, and 400, or 200, or 88 another? The pull from the floor is a basic function of human skeletal and muscular anatomy, and it is controlled by the physics that operate this system of levers. This is obviously true, but less obvious is why.

⇒ ...article continues on page 29

Parkour Basics

A Compendium

Jesse Woody page 2 ⇒

Learning the Olympic Lifts - The Stance

Mike Burgener with
Tony Budding

page 11 ⇒

The Triangle

Becca Borawski

page 13 ⇒

Bike Control Basics

Ascending Obstacles

Scott Hagnas page 16 ⇒

The Fire Service and CrossFit

The Perfect Combination

Mike Contreras page 18 ⇒

What Do We Know?

Tony Leyland

page 21 ⇒

Forging Mental Fitness

Jim Decker

page 22 ⇒

Gymnastics Hurdle

Roger Harrell

page 24 ⇒

Kettlebell Basics

Drills for Improving Your Swing

Jeff Martone page 26 ⇒

A New, Rather Long Analysis of the Deadlift

Mark Rippetoe

continues page 29 ⇒

The Grinder

CrossFit FRAGO #4, "YBF"

page 33 ⇒

Parkour Basics

A Compendium

— Jesse Woody —

Mechanics, consistency, and intensity are the three pieces of a complete foundation for a safe learning progression in any new endeavor. Many of the elements inherent in the gradual and progressive creation of elite general physical preparedness apply equally to the pursuit of more specific skills and goals, including parkour; the ability to navigate your environment functionally, confidently, and safely in a variety of situations.

This month, I have collected into a single reference document the fundamental parkour moves I discussed in greater detail throughout the past eight issues. I intend this to serve as a kind of “getting started” reference manual for parkour, outlining a progression for learning proper technique that enhances both the safety and the efficacy of the movements when applied to the varied challenges you may face.

The basic straight landing and roll



The first step in learning both landing and rolling techniques is to perfect the air squat, as described in the December 2002 issue of the *CrossFit Journal*. Once you achieve the basics of perfect squat form, you will be able to transfer them to the proper technique for the landing and roll:

- Back arched and head up.
- Weight balanced on both feet.
- Knees pushed out to the sides throughout the entire movement.
- Find the ground by extending your legs.
- Control the descent by preparing for the drive into a sprint.
- Shoot for 15 to 20 comfortable reps at a given height, starting very low and progressing slowly to ensure flawless technique.

Proper mechanics in rolling requires merely that you grasp three simple aspects of the movement:

- Stance is shoulder width, in a slight lunge, head tucked into armpit and looking toward trailing leg.
- Sweep your lead hand through toward your trailing foot to set up your round position and guide your scapula to the ground.
- Tuck tightly throughout the movement and allow your momentum to carry you to your feet.



Once these basics can be repeated perfectly from standing, the next step is a roll with momentum:

- Land in the same stance from a slight hop: Feet shoulder-width apart, one foot forward, leaning forward, weight on the toes.
- Allow your momentum to carry your torso forward as your knees bend.
- When your body reaches near 45 degrees, boost yourself forward with a hop into a diving roll (tuck your head, sweeping your lead arm through, and tuck tightly).
- Try 10 to 15 jumps to roll on both sides per training session, progressing in height gradually over time.

Parkour Basics: A Compendium

...continued from page 2

Jumping technique

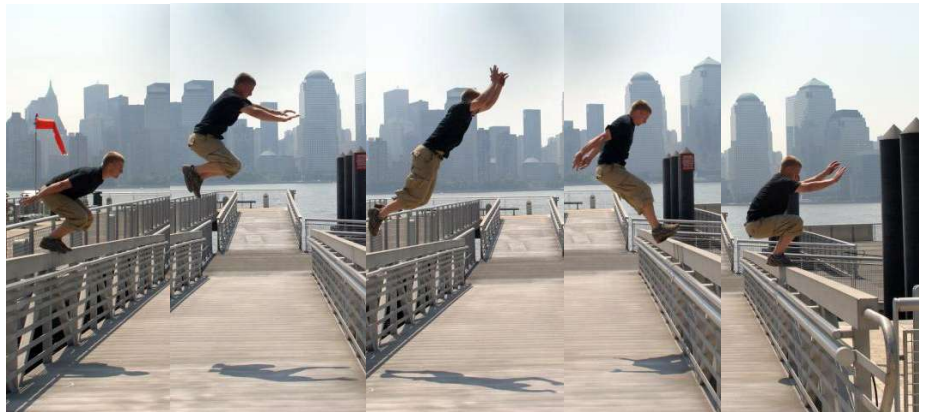


Straight jump

The basics of jumping technique and the concept behind the precision jump apply to nearly every jumping movement in parkour.

- Stand with your feet directly below your hips in the jumping position and bend at the hips and knees while swinging your arms back. Explode through the hips, knees and ankles as you swing your arms toward your path of travel.
- Tuck your knees toward your chest mid-jump to maximize the efficiency of travel while you're in the air.
- For both the straight landing and the precision landing, you will extend from this tucked position toward the point of landing. In the precision jump, you will be jump at about a 45-degree angle and extend your legs in front of your torso to allow your momentum to carry you to your feet in balance as you absorb the impact.

⇒ Making [precision trainers](#) will help the practice of this technique immensely. Shoot for anywhere from 20 to 50 consecutive jumps, landed in perfect balance.



Precision jump



Precision trainers



Parkour Basics: A Compendium

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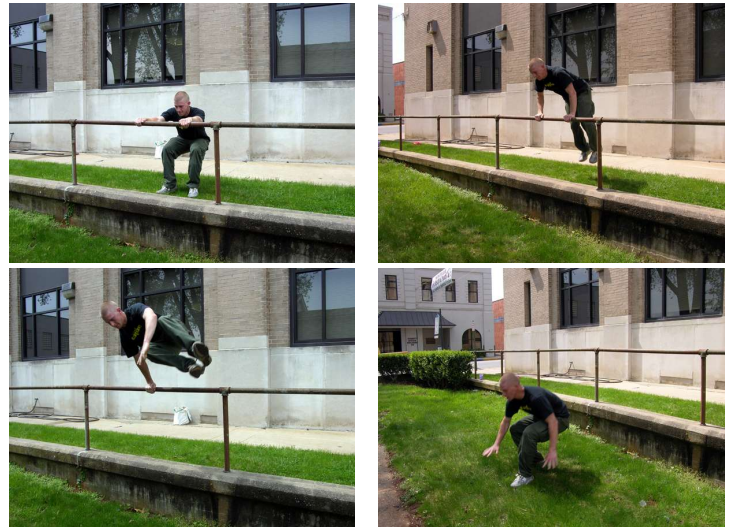
Vaulting technique

Remember that every vaulting technique relies on the basic movement pattern of using your approach momentum and a

perfectly mixed effort between your upper and lower body to make your way over an obstacle as efficiently as possible.

Two-handed vault

- Start from standing, bending at the knees and hips to jump while also pushing the object down and back with your arms. Balance the jump and press so as to maximize the effectiveness of the movement.
- Pay close attention to the landing, making it as smooth and silent as possible.
- Train in both directions, as early exposure to multiple angles will help immensely in the long run
- Shoot for fast, repetitive vaults from one side of a rail to the other and back, without pause and with perfect technique, for 10 to 15 reps as regular training.



Lazy vault

The lazy vault is similar to the speed vault in that it's essentially a one-handed technique, but it requires less momentum to move over obstacles.

- Approach from an angle with your lead hand nearest the wall. Jump as you press toward your hips with this hand; then pass the railing to your trailing hand and finish the descent.
- Train this movement in both directions and on a variety of obstacles.
- Once you can perform the basic movement, train your ability to change and choose the direction of retreat in midair by adjusting the rotation of your torso and the pressure you apply to the wall or railing with your trailing hand.
- Add lazy vaults to a rail circuit (move directly from a left-handed lazy vault to a two-handed vault, back to a right-handed lazy vault, to another two-handed vault), attempting to complete as many passes as possible in a set time. This works great with Tabata timing.



Parkour Basics: A Compendium

...continued from page 4

Speed vault

The speed vault takes the basic one-handed vault and adds extra approach speed. Commitment to a powerful approach is what sets this vault apart from the more basic techniques.

- Try to minimize the impact on your hand by approaching quickly and powerfully and attempting to jump up and over the object in question, using the boost from your hand and arm as only the last bit of propulsion needed to clear the obstacle.
- As with the two-handed vault, practice on both sides from the beginning.
- Attempt to perfect fast and smooth speed vaults from a variety of angles on a variety of obstacles. Once you can perform 8 to 10 fast speed vaults in a row on both sides on a variety of terrain, you have reached a functional level of proficiency



Monkey vault

For the monkey vault, a bit more commitment is required. To make this work, you have to make a powerful dive toward the end of the object that puts your hips higher than your hands.

- Get your hips high by diving in an arc and exploding with a powerful push when your hands contact the obstacle.
- Your hands should be free of the object before your feet pass.

- When you can land a monkey vault on a variety of obstacles with a slight run-up, progress to increasing your approach speed and the speed of your retreat. You can also increase the depth of the objects that you're vaulting.
- A monkey vault to roll, repeated 10 to 15 times with perfect technique, is a great drill to improve two techniques simultaneously.



Parkour Basics: A Compendium

...continued from page 5

Turn vault



The turn vault applies the concepts of the basic two-handed vault to a movement useful for breaking momentum and reducing the impact of the landing from greater heights.

The turn vault applies the concepts of the basic two-handed vault to a movement useful for breaking momentum and reducing the impact of the landing from greater heights.

- Start by training on a wall or railing with level ground on both sides. This allows you to master the movement pattern before adding height to the equation.

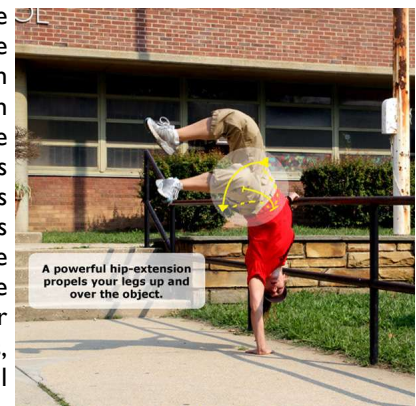
- Once you can smoothly perform the vault to both sides on level ground, move to an object that has a slight drop and requires a more precise placement of the feet.
- Shoot for 15 to 20 turn vaults to each side without a break in proper technique. Once you can accomplish this at a slow pace you can begin to quickly cycle turn vaults from one side to the other for an excellent conditioning movement.

Gate vault

For the gate vault, use a powerful hip extension to propel your legs up and over an object after you have folded at the waist to position your torso on the opposite side. This is a very useful technique for taller objects that aren't stable enough for a wall run (such as chain-link fences).

- The starting object for this movement is the same as with the turn vault: a wall or railing with level ground on both sides.
- Once you grasp the technique from level ground, move to an object with a slight drop. From this point you can then find taller objects that will require a jump to put your hips at the proper height.

- Once you're comfortable with the technique, you can choose an appropriate obstacle and attempt to pass over the object as many times as possible in five minutes using only the gate vault. As your technique improves, your total will improve also.



Parkour Basics: A Compendium

...continued from page 6

Reverse vault

The most useful application of the reverse vault is for maintaining momentum over multiple objects where the rotation aids in transitioning smoothly from one to the next.

- The rotation can be learned relatively easily on an object slightly lower than waist height. Work the requisite jump and pressing motion with the hands and remember that the rotation follows the head and is transferred through the core to the hips to bring your feet over.
- Expand your capabilities with the movement to some more-varied obstacles, starting at first from standing and working up to approaching with speed.
- Once you have a solid grasp of the technique in both directions, you can progress transitioning into a reverse vault when you approach one obstacle immediately after another. For example, pick two railings around waist height that are between 3 and 5 feet apart. Vault the first railing and then attempt to land in a position that allows you to spring directly into the reverse vault. To do this you will land with one foot slightly forward and your hands ready to make contact with the second surface. Immediately spring into your rotation over the railing in one smooth motion.

- Once you grasp this technique, see how many passes you can make over the two railings in five minutes, or apply any interval timing to repetitive efforts scored by total reps. Increasing your total while assuring proper mechanics is a sure sign that you're getting more efficient at the technique.



Parkour Basics: A Compendium

...continued from page 7

Climbing and swinging technique

For climbing-based techniques in parkour, the goal is to coordinate your upper and lower body to propel yourself upward as quickly and smoothly as possible. This skill carries over to the

running- and climbing-based techniques because they all require you to effectively transfer momentum from the run into vertical travel.

Tic-tac

The wall run, tic-tac and pop or tap vault take some of the basics learned in vaulting and add a greater full-body component to allow travel over taller or deeper obstacles.

- To learn the tic-tac, practice the requisite cadence and coordination between the run and the step off of an object by incorporating a knee-high or lower wall into the middle of a run and stepping on top of the wall to propel yourself up and out in the direction of your travel. Train this from both directions.
- If the opportunity presents itself, it works great to transition from the horizontal surface of a small retaining wall to an angled surface such as a slanted wall or tree trunk. Retain the cadence you learned in the first drill, only this time your boosting step will take place on a more vertical surface. Gradually increase the angle if at all possible until you are able to perform the movement on a purely vertical surface.
- To train the tic-tac in its purest form, it works well to find a bench, trash can or other medium-sized object to place in your path of travel to attempt to propel yourself over after the tic-tac. Play with the distance from the wall or tree that you are boosting from to find your limit, then drill the movement from this point for 20 to 30 times on each side, shooting for perfect tic-tac and landing technique for each rep.



Wall run and pop vault

Once you have mastered the technique in the tic-tac, you will have gained an essential awareness about applying the momentum from your horizontal travel to vertical movement. At this point you can use a similar technique for the wall run and pop vault.

- The technique for the wall run and pop vault is the same as for the tic-tac, only it's applied to purely vertical movement aided by the upper body. Find a wall around your height to start with. Run powerfully and confidently at the wall and play with the proper distance to maximize the height of your step off of the wall. Once you reach the apex of this step, apply a coordinated pull toward

your chest with your hands and a rearward kip with your free leg to help you pull yourself to the top of the wall and transition to a support on top.

- For both of these techniques, the best training progression seems to be based on finding a wall that you can comfortably and consistently overcome, and then repeating the move 15 to 20 times, shooting for maximum speed and commitment on each attempt. Once you have mastered this height (with both feet) you can move up to higher walls and continue drilling the technique in the same manner.

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Parkour Basics: A Compendium

...continued from page 8

Wall run and pop vault *...continued*

- Another great way to expand your skill in this movement is to go head to head with another practitioner to see who can make it to the top of the wall the quickest. The motivation for 100% maximum effort that is gained through competition can't be matched by any other means.



Cat leap

The cat leap is similar to both the wall run in its finishing top-out and the turn-vault in its body position upon landing. This is a movement that takes a good bit of commitment to work up to, but the gains in strength, coordination, and confidence that are gained are worth the effort.

- A body-height wall at ground level is perfect to begin your training on. Perform a broad jump, tucking your legs up and then extending them toward the wall to absorb the force of landing. Your hands will contact slightly after your feet, with elbows bent to absorb the force of impact. From here the technique resembles the top-out of the wall run, where you give a rearward kip with your free leg while performing a movement similar to a muscle-up to put yourself in a support position on top of the wall.
- Drill this ground-level technique to perfection, and then you can begin to progress toward downward cat leaps.

In this technique, the surface from which you jump will be at the same level as, if not slightly higher than, where your hands will contact the landing surface. As the vertical distance between the takeoff and landing points—and therefore the impact upon landing—increases, the technique becomes more difficult. A good progression would be: 1) higher-level landing, 2) higher-level landing with a longer jump, 3) level of landing decreased by half-height (around knee-level from takeoff), 4) same-level landing, same-level landing with a longer jump. Drill each successive level 10 to 20 times in a session, striving for perfectly efficient technique with minimal extraneous impact.

- The technique can be broken in half, as you can drill the jump and landing as one piece, then drill the top-out repetitively for strength gains. This allows the pull to press movement of the top-out to be worked



Parkour Basics: A Compendium

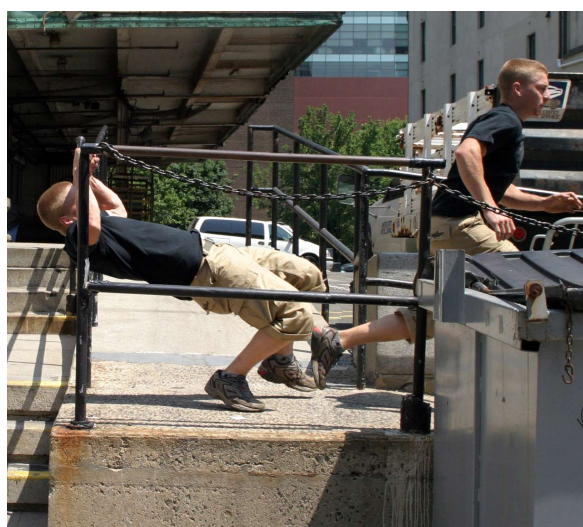
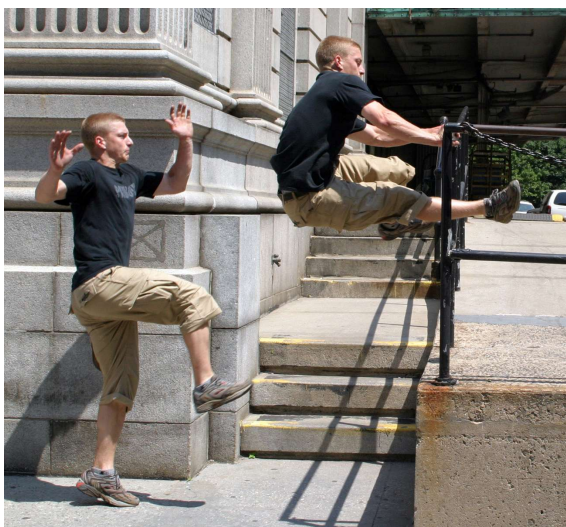
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Underbar

There are innumerable places to train this movement and its derivatives, from the most-common parallel railings to tree branches or car windows. Once you master this movement, you will never be at a loss for possibilities.

- Start your progression by playing with the basic swing on a pull-up bar or monkey bar. Shoot for maximizing the distance you are able to gain post-swing by extending your hips and elbows as you reach the apex of the swing. You should be reaching maximum hip-extension at the peak of the movement, and coordinating the motion of your arms to allow maximum power to be applied before extending your elbows to proceed in a powerful arc at this point.
- From this point, attempt to approach the obstacle with a good run-up, then tuck tight and get your feet in front of your torso in the jump. Grab the railing and, just at the apex of your swing, extend your hips and arms.

- Once you become proficient at maximizing the power of the swing in this manner, you can add the “underduct” trick mentioned last month. Pull a length of duct tape between two vertical supports and attempt to swing through this space. This allows you to work on progressively smaller underbars without the risk of injury.
- During a typical training session, it would work well to strive for 20 perfect underbars at a given width before moving on.
- Once you have gained confidence and awareness of your potential for movement through different spaces, you can begin to apply this to any random obstacle in your environment. Once you find a good object to use for training the underbar, be sure to check it from all sides for other potential variations of the movement to apply and expand your abilities.



So there we go, a quick recap of the common movements and what I hope is a manageable progression for new and old athletes alike. If you progressively increase your skills while paying proper attention to recovery, you can sustain your parkour training

indefinitely and reap rewards in terms of ability and agility that will serve you well in all physical aspects of life for a long time to come.



Jesse Woody, age 26, father of two, has about eight years experience in fitness and nutrition (though a lot of that was time wasted on bodybuilding). He works in various capacities for the Woodberry Forest School in Virginia, including working with the outdoor education department and, currently, transitioning to head strength and conditioning coach. He's been practicing parkour for three+ years (and CrossFit for a little over one), though he's acted like a monkey his entire life. He is an administrator and frequent content contributor for the [American Parkour website](#). ↩

Parkour articles in the *CrossFit Journal*

<i>Introduction to Parkour</i>	#43 - March 2006
<i>Environmental Awareness & the Roll</i>	#44 - April 2006
<i>Two-Handed, Speed, & Lazy Vaults</i>	#45 - May 2006
<i>Monkey, Dash, & Reverse Vaults</i>	#46 - June 2006
<i>Jumping</i>	#47 - July 2006
<i>Tic-Tac & Wall Run</i>	#48 - August 2006
<i>Turn Vault & Cat Leap</i>	#49 - September 2006
<i>Underbar & Gate Vault</i>	#50 - October 2006

Learning the Olympic Lifts

The Stance

Mike Burgener with Tony Budding

All of the Olympic lifts (the snatch, the clean, and the jerk) are nothing more than a jump and a land. The jump is a vicious extension of the ankles, knees, and hips that creates momentum and elevation on the barbell. In the brief moment that the barbell becomes weightless from that jump, the lifter aggressively pulls (or pushes, in the jerk) himself under the bar and lands with it in the receiving position.

As simple as this may seem, there are many components to successfully jumping and landing with weight and many common obstacles that make it hard to move and receive heavy weights. This article is the first of a series in which I'll talk about single aspects of the lifts in detail, along with common faults and effective remedies.

Jumping and landing positions

Proper foot placement during the Olympic lifts is critical to successful lifts. Years ago a good friend of mine, Senior International coach Steve Gough of Ennis, Montana, told me that 90% of all missed lifts performed in competition could be traced to the feet. The problem might be with the stance at the beginning of the pull, with the width of the feet in the receiving position, or with the placement of the feet during the drive portion of the jerk.

The proper stance in the pulling, or jumping, position aligns the feet under the hips. This jumping position allows more force against the ground when driving the bar upward. This is also the most natural stance—the one that 99% of the population naturally assumes when asked to prepare to jump high: the feet directly under the hips. If the feet are too wide, the potential

for power is lost. If the feet are too close, both balance and drive are sacrificed. The remedy is simply to consciously place the feet under the hips to begin the pulling sequence.

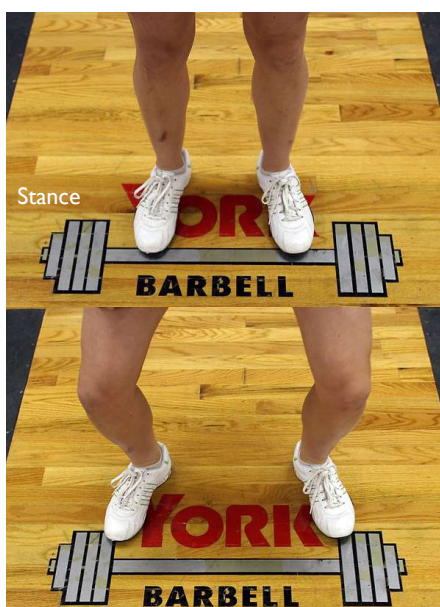
The width of the landing position is approximately 1 to 3 inches outside the jumping position, or generally under the shoulders, with the knees bent, chest up, back arched, and weight placed on the feet from mid-foot to the heel. The movement

of the feet from the jumping to the landing position should be fast and aggressive, without any excessive lift of the feet (which is known as donkey kicking). This is true for the clean, the snatch, and the push jerk. (The split jerk landing will be covered in a separate article.)

A lot has been written about weight distribution on the foot throughout the lifts. From a practical standpoint, the athlete should simply concentrate on keeping the weight back toward the heels. The posterior chain (glutes, hams, low back), which is the source of our greatest power, cannot be fully engaged if weight is transferred forward onto the toes. In most athletes, the heels will rise at some point between the jump and the land, but the longer it can be delayed (within reason), the more power is transferred to the bar.

Common faults and remedies

If the feet are too wide in the landing position, the athlete loses the ability to receive the weight in a controlled manner, and his ability to recover strongly out of



Good movement

<http://media.crossfit.com/cf-video/Good.wmv>



The Stance

...continued from page 11

the low position is compromised. The same goes for receiving the weight with the feet too narrow, which both limits the athlete's flexibility and reduces the stability of the body in receiving the bar.



Clean Wide Catch



Snatch Wide Catch

Wide Catch

<http://media.crossfit.com/cf-video/Wide.wmv>

The landing position should be the same as the bottom of a proficient front squat for the clean and the bottom of a proficient overhead squat for the snatch. Many athletes with otherwise good squats still catch too wide because they are uncomfortable with the dynamic nature of these lifts. Practicing clean drops and snatch drops are a great way to develop confidence in the proper landing position.

In the assistance exercises I call drops, the bar is brought to the proper receiving position for a power version of the lift (racked on the shoulders for the clean, and locked overhead for the snatch). Without heaving or jumping in any way, the athlete aggressively pulls his body into the landing/receiving position. The feet should come off the ground to move from the jumping/pulling to the landing/receiving position, and there should be a noticeable sound when they reconnect. The body should be kept tight, and there should be

minimal sinking once the feet hit. Practice landing as low as possible, tightening the core and lifting the knees without jumping. Obviously, this should be practiced with very light weight at first.

If the athlete is still landing too wide, lines can be drawn on the platform/ground at the proper landing width. The athlete gets immediate feedback on the success of the landing. For extremely stubborn athletes with fully functional hips, a couple objects (perhaps something forgiving such as Dynamax medicine balls) can be placed just outside the proper landing position. There is some risk of injury with this, so caution should be employed.

Donkey kicking, or excessively lifting the in moving from the jumping to the landing position of the feet, is another common problem in the Olympic lifts. It creates too much hang time with the body, as well as instability in the landing, caused by too much impact with the bar upon landing.

Clean drops and snatch drops are excellent remedies for donkey kicking, as are clean lands and snatch lands. The only difference between drops and lands is that a slight heave or jump is permitted with the lands. The bar starts and ends in the receiving position in both. It can also help to cue the athlete to make the foot movement quicker, not louder.

Jumping forward is the third most common flaw in these lifts. The heavier the weight is, the more jumping forward tends to be a problem. It results primarily from jumping too early—that is, jumping from the knees without a scoop or double knee bend, which will be covered in a future article) and/or keeping the bar away from the body. If the forward jump results in the athlete rolling onto their toes (as in the attached video), any attempt with a significant load is guaranteed to fail, as the posterior chain has been disengaged. [ForwardToes.wmv]

The simplest remedy is to draw a line on the platform parallel to the barbell. The athlete should begin the lift with their toes on the line and compare that with the placement of the feet in the landing position. You can also use cues such as

“Weight on the heels,” “Keep the bar close to the body,” and “Be patient. Bring the bar into the hips before jumping.”



Donkey Kick

Donkey Kick Video

<http://media.crossfit.com/cf-video/Donkey.wmv>

The Stance

...continued from page 12

Conclusion

The development of proper mechanics and movements should always be done with essentially no weight (a PVC pipe or wooden dowel). It is a myth that adding weight will correct flaws. Adding moderate weight may mask flaws, but the athlete's progress will be abruptly and artificially limited by the masked flaw. Once perfect technique is achieved at low weight, load can be increased gradually. If proper mechanics is lost at any point, the weight should be reduced until proper technique is regained.

These remedies can be used at any point to fix flaws. They can also be used as warm-ups to reinforce proper techniques. When training others, explain that they are going to jump the barbell through a range of motion, creating momentum and elevation on the barbell. Have them align their feet in the jumping position and then, on your cue, walk their feet out to the landing position, then back to jumping. After several repetitions of this, familiarity is established. Then, have them do several repetitions of jumping from the starting position to the landing position. This seemingly mindless exercise trains the mind and can prevent hours of frustrating attempts to correct improper jumping and landing stances.



Mike Burgener, 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 coach (2005), and strength and conditioning coach at Rancho Buena Vista High School in Vista, Calif.

The Triangle

— Becca Borawski —

Due to the efforts initially of the Gracie family, and many others to follow, Brazilian jiu-jitsu was introduced to the United States in the 1970s and has since thrived. Jiu-jitsu has evolved into a popular art and one of the essential elements of the growing sport of mixed martial arts (MMA).

The triangle symbolizes Brazilian jiu-jitsu both philosophically and physically. The triangle shape is embedded in the logos of schools across the country. It represents not only the distribution of balance and strength that a jiu-jitsu player's body should possess but also the spiritual aspect, the three sides representing mind, body, and spirit. In its simplest, most physical explanation, though, it represents the submission known as the triangle choke.

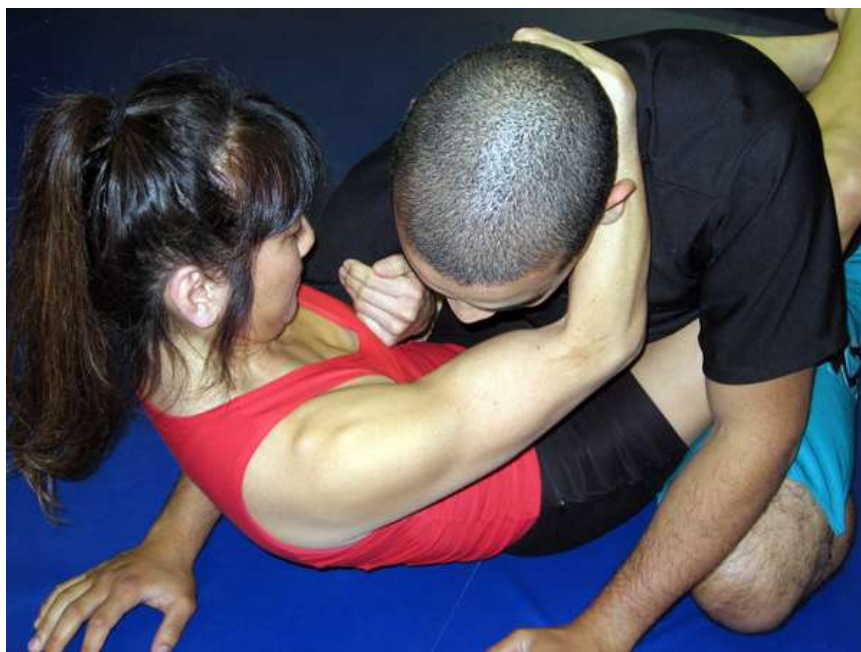
The triangle choke is a blood choke, which restricts the flow of blood through the

carotid arteries to the brain. When applied properly, it can quickly render the opponent unconscious.

The set-up for the triangle varies depending on whether you are training with or without a gi (traditional kimono-style jacket). For the sport of mixed martial arts, which is the most functional and practical of the modern martial arts, no-gi techniques are most applicable.

As I describe the points of the triangle, Cindy Omatsu demonstrates the movements in the photographs. Cindy has been studying Brazilian jiu-jitsu for well over a decade, is a black belt under Rigan Machado, and was the first American woman to be given the distinction of black belt.

Photo 1



The most effective way to control an opponent in no-gi jiu-jitsu is to overhook one of their arms and pull their head down. While doing this, you should be sitting up in a "crunch" position. The goal is to constantly limit the amount of space between yourself and your opponent. It is all about pressure and constriction. In

photo 1, Cindy Omatsu has her opponent's left arm overhooked and is clamping her left elbow to her ribs. She is pulling down on his head with her right hand.

The Triangle

...continued from page 13

Photo 2

The next step is to gain wrist control of the free arm. There are different ways to maintain control of your opponent once you let go of their head. Some people teach to keep your leg across the back of the opponent. In this case, Cindy prefers to keep her left foot lodged on the hip of her opponent, controlling his movement. She can also use this to angle herself to her right, so she is no longer directly in line with him. This will help her when she makes the move to lock in the triangle and results in a tighter triangle. Changing the angle will also help people who struggle with flexibility.

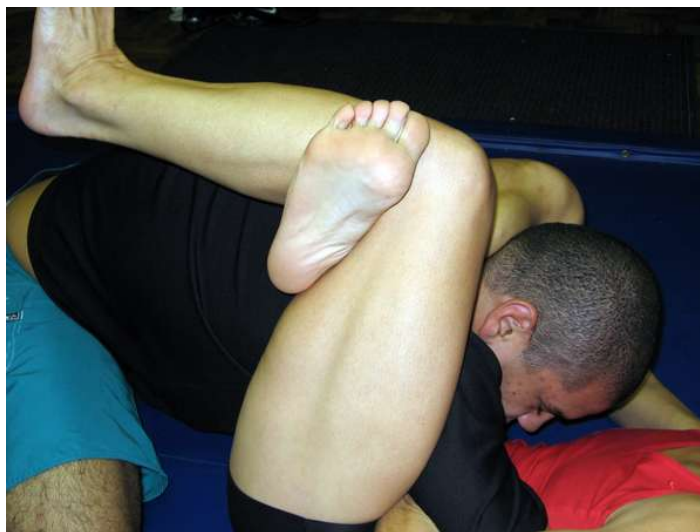
Cindy can then grab his wrist to trap his free arm. She has two options: she can grab the free hand, with her thumb toward the ground, and push it between her legs, quickly pulling her own arm out in order to cinch the triangle with her legs. Or she can push his hand to the outside, with her thumb toward the ceiling, and pull her leg through. Either approach will leave him with one arm trapped in front and one arm behind him. Any time an opponent has "one arm in," they are susceptible to a triangle choke.

In photo 2, Cindy is pushing his arm to the outside, so next she pulls her leg through the space she has created and anchors her right foot behind her left knee. It is important to lock the foot tightly behind the knee. You can use your hand to pull on your foot and accomplish this.



Photo 3

Make sure the top of the foot or the base of the ankle is behind the knee. It should not be the arch of the foot or the toes. You should be able to flex your foot and use it as a hook around your knee. Your other foot should be cranking downward to create tension and increase the tightness of the triangle (photo 3).



The Triangle

...continued from page 14

Photo 4

Many instructors teach to slide the trapped arm across the chest, but it is not absolutely necessary to complete execution of the triangle. The two most important things, once you have cinched your legs into the triangle, are squeezing your knees together and pulling down on your opponent's head (photo 4).

The strongest grip to use when pulling on the opponent's head, and in general in no-gi jiu-jitsu, is what wrestlers call the "Gable grip" (photo 4). Make a thumbless paw with your hands and grip them together. Push outward with your elbows while gripping your hands and pulling them downward on the back of your opponent's head.



Photo 5

This whole time you should be squeezing your knees together, creating as much pressure as possible and making the actual triangle created by your body as small as possible. At this point you should also lift your hips up into the air. If your opponent is successful in his defense and has not yet tapped, the arm can be pushed to the side for added help in completing the triangle.

Be aware that your opponent will be actively trying to escape and one of the very real dangers in applying a triangle is that of getting slammed. Though not legal in many grappling tournaments, slamming is fully accepted in MMA. To safeguard yourself from getting slammed, use your arm to hook your opponent's leg and hug it to you, preventing them from standing and pulling you up into the air. In this case, Cindy would underhook her opponent's left leg with her right arm.

Always be ready to switch to an alternate submission while you are fighting for the triangle. The arm bar frequently appears as an option when your opponent is fighting to escape and possibly attempting to stand up (photo 5).



Practice Drill

A useful drill for practicing triangles is to partner everyone up and practice cinching the triangle, repeatedly trapping either arm of the opponent. This can be done as a warm-up or part of a technique section of class:

1. Partner A is in the guard of Partner B.
2. Partner A offers his left arm forward, offering no resistance, but maintaining proper posture.
3. Partner B applies the triangle and Partner A taps when appropriate.

4. Partner A then switches arms and offers his right arm forward. Partner B then applies the triangle on the other side.

The idea is to flow quickly back and forth, doing a series of ten triangles, always paying close attention to the details—getting the foot cinched in at the ankle, cranking the other foot downward, squeezing the knees together, pulling on the head with the proper grip, and arching the hips. Once Partner B has completed ten triangles, the partners should switch positions and continue the

...continued next page.

The Triangle

...continued from page 15

Practice Drill ...continued

drill. Done regularly, this drill will help the technique feel more natural and will increase flexibility.

This drill can also be used to practice squeezing the knees together. Use the drill time to attempt to elicit the tap just by using the squeezing alone, without the head pull.



Examples of the triangle choke in action

For a good triangle example, watch Matt Hughes vs. Carlos Newton in UFC 34 to see an infamous battle and the use of slam technique for defense.

Quinton Jackson also successfully used this defense against Ricardo Arona at Pride Critical Countdown 2004, resulting in a stunning knockout.

In the world of grappling, Eddie Bravo vs. Royler Gracie contains an excellent example of a triangle choke executed by Eddie Bravo.

⇒ * Sherdog.com is a great resource for videos of grappling, fighting, instructionals, etc.

⇒ **Becca Borawski** teaches and trains at [Petranek Fitness/CrossFit Los Angeles](http://PetranekFitness.com) in Santa Monica, Calif. 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 together to produce DVDs and build websites for professional fighters. Her main job is as the music editor on the TV show *Scrubs* and she currently trains jiu-jitsu under Eddie Bravo at 10th Planet Jiu-Jitsu in Hollywood.

Bike Control Basics

Ascending Obstacles

— Scott Hagnas —

In the first installment in this series on bike skills, last month, we looked at some static skills, where you mostly balanced in place. In practicing those movements, you will have learned to lift your bike airborne and also will have gained some control rocking the bike from wheel to wheel. Now it's time to use those new skills to do something a little more useful—get up onto things.

Before we start, there are a few precautions. Though it should be obvious, you should start on small objects. Make sure that you have the technique mastered before you start trying these moves at any real height. Getting on top of objects does not present as much danger as getting off them, but things can still get ugly. Consider wearing shin guards.

Make sure your bike is in good condition, especially your brakes, pedals, cranks, and chain. Depending on what objects you will be climbing and what type of terrain you are in, your tire pressure may need to be adjusted. If you are riding street obstacles with sharp edges, you will want higher tire pressure to avoid a pinch flat if you catch a wheel on an edge. If you are rolling onto rounded objects or riding natural off-road terrain, lower tire pressure will help grip the surface better. Fatter tires will help too.

As I mentioned in last month's article, all the skills that we are covering can be performed on most kinds of bicycles. That said, you will begin to see in this installment that certain kinds of bicycles will be more suited to these skills than others. The photos and videos here intentionally demonstrating these skills on low obstacles that shouldn't require specialized bikes. The higher the obstacle you wish to ascend, the more likely you are to need a specific kind of bicycle.



Rollups

<http://media.crossfit.com/cf-video/Rollups.wmv>



Wheel swap roll-up

The wheel swap is the smoothest and simplest way to get onto low objects. It can even be used on fairly high obstacles once you have mastered the technique. The wheel swap builds on the rocking trackstand skill from last month.

Start on a low object like a curb. Roll toward the curb slowly, with your pedals level. Your power pedal should be forward. Shift your weight back and pull up on the handlebars to lift the front wheel onto the object. As soon as your front wheel touches down, throw your shoulders forward over the bars to unweight your back wheel. Push the bars forward as you do, and your back wheel should lift up smoothly to the top of the object. This should feel very similar to the rocking trackstand, except now you are rolling and you do not use your brakes.

The timing is important. If you hesitate too long after setting the front wheel down before shifting forward, your rear tire will smack into the obstacle. With practice, you will instinctively learn how quickly to make the shift. This will depend on how fast you approach the obstacle, and how tall it is. With faster approaches, the wheel swap technique simply cannot be done, as

Ascending Obstacles

...continued from page 16



there isn't enough time to make the shift. In these cases, a bunny hop will be needed instead. Try the wheel swap technique from different angles once you get it perfected. It can even be done riding alongside small ledges and similar obstacles.

If your bike has a low gearing, such as a trials bike or mountain bike in granny gear, you can do a wheel swap from a standing start. Balance in a trackstand just less than one crank stroke from the obstacle. Your power pedal should be forward. Pedal forward, and as your opposite foot (goofy foot) comes forward, wheelie your front wheel up onto the object. Once it touches, shift your weight forward just like the standard wheel swap.

Backhop

<http://media.crossfit.com/cf-video/Backhop.wmv>

Back hop

You are not likely to use the back hop much on its own unless you plan to ride advanced bicycle trials. However, it is very useful as a beginning drill to learn to bunny hop properly. Before trying the back hop, make sure that your back brake is working properly and will lock the back wheel.

Ride slowly forward, pedals level, with your power pedal forward. Your back should be flat so as to maintain a tight core. Apply both brakes to come to a momentary stop. Lean back, and pull up on the bars to lift your front wheel. As it rises, explode upward with a powerful hip extension. As the bike lifts airborne, you will pull up on the bars, then push them forward as the bike rises. Tuck your legs up tight to your body, pulling the bike up as high as you can. Once you start to return to earth, let the back end land first, compressing your body to absorb the shock. Try to always avoid landing on both wheels simultaneously, as this is hard on body and bike!

Start with small hops. It will probably take considerable practice to get the timing of this move perfected, unless you have prior experience with it. Eventually, you will be able to jump high with good technique. You will notice a hip extension in the back hop that is very similar to the hip extension of a clean or kettlebell swing.



Ascending Obstacles

...continued from page 17

Bunnyhop

<http://media.crossfit.com/cf-video/Bunnyhop.wmv>

Bunny hop

Bunny hops are the classic way to get your bike up or over objects. The technique is almost exactly the same as in the back hop, except now you are rolling forward and will not use your brakes.

Approach your obstacle fast enough to clear the edge. This will take a bit of practice to judge. Just as in the back hop, your pedals will be level, with the power pedal forward. Compress with both arms and legs as you near the obstacle, then lean back and pull up on the front wheel. All your weight will be pushing through the rear tire into the ground. Explode with a powerful hip extension, driving off the ground through the legs.

As in the back hop, pull up on the bars, then push them forward and tuck your legs to give you the clearance to get over or onto your obstacle. As you tuck, grip the pedals with your feet by pointing your toes downward. Whether hopping over or onto something, always be sure to land rear wheel first.

With good technique, you will be able to hop medium height objects almost effortlessly. Keep practicing, and slowly move onto higher obstacles as you gain confidence. You can also work at bunny hopping over things at speed, or hopping onto things at an angle, or from the side.

Scott Hagnas is owner of **CrossFit Portland**. He is certified as a CrossFit trainer and Circular Strength Training (clubbell training) instructor. He has been riding BMX flatland for 26 years and counting and has filmed/produced /edited several series of BMX videos. He formerly competed in bicycle trials, placing second in amateur in the World Championships in 1990. When not training or riding, Scott can usually be found in the kitchen cooking up Paleo-style meals. He writes a monthly recipe column for *The Performance Menu* magazine.

The Fire Service and CrossFit

The Perfect Combination

Mike Contreras



The Orange County Fire Authority (OCFA) serves 1.3 million residents in southern California. Responding from 60 fire stations, OCFA covers over 550 square miles. The OCFA has more than 800 career firefighters. To help them manage their fitness, the Fire Authority established a wellness and fitness program in October 2003 (IAFF and IAFC Wellness and Fitness Initiative).

As a result of the wellness and fitness program, OCFA basically stumbled onto CrossFit. Starting in September 2004, our trainers began traveling around the country attending seminars and workshops on a variety of workout topics. Some of these courses were very informative some where a waste of time the goal was to build a functional movement-based program, focused on performance.

It was during this time that a new member of the department, firefighter Tony Duchi, introduced his fire station crew to a web-based workout program called CrossFit. One of the crew members was Jeff Hoey, one of the department's 36 ACE-certified trainers. Jeff contacted me and a few other trainers and we began to do the workout of the day (WOD) as prescribed. The first

The Fire Service and CrossFit

...continued from page 18



thing that came to mind during the workout was that they were fun. The workouts created competition between crew members and left each firefighter feeling like they had just finished fighting a fire. As we further explored the CrossFit methodology, we realized this was a perfect workout for firefighters because the exercises simulated fireground functional movements, the workouts were done at firefighting intensity, and the movements were as varied as the emergency call load.

Needless to say, we were sold.

We proposed a change in the way physical fitness was done during the fire department's 14-week basic firefighter recruit academy. The fitness program in previous academy sessions had consisted of forced-march runs and a traditional weight training circuit. OCFA management was open to the idea of changing the academy fitness program in hopes that the new program would help decrease the number and severity of injuries experienced in previous academies. In order to correctly evaluate the needs of the academy, a task analysis of the department's manipulative skills was done. The analysis revealed that the majority of firefighting tasks included squatting, lifting, pressing, and pulling. Tasks were typically done with 60 pounds of protective clothing and respiratory protection, not including the weight of the hose, ladders, tools, and other implements. The analysis also revealed that movements and tasks were performed for extended durations, at various intensities. In fact,

most skills resulted in a heart rate between 165 to 190 beats per minute for 20 to 30 minutes, without a break.

The CrossFit methodology was gradually introduced in the recruit academy, and we began the first few weeks of the academy with basic movements, spending a lot of time and attention on correct form. WODs were introduced during the third week of the academy and were used as part of the fitness program for the remainder of the 14 weeks.

The results were amazing! The recruits showed a 14% improvement in their fitness level from week 2 to week 13 of the academy, indicating an increase in muscular strength and endurance. In addition, 55% of the recruits reduced their body fat percentages. The results of the 30-minute endurance workout showed a 67% increase in the average number of repetitions the

recruits were able to perform. Heart rate data gathered during the workouts also indicated that the physical training program was adequately preparing recruits to work at the exertion level that is required on the job (165 to 190 beats a minute, as mentioned above).

According to post-academy questionnaires, recruits were satisfied with the physical training program and said that the program had adequately prepared them for the physical demands of being a firefighter. Moreover, not a single recruit lost instruction time due to injury.

The recruit academy fitness program was a success and a decision was made to share the CrossFit methodology with the men and women who make up our operations personnel. One challenge of implementing fitness programs in our department is the 800 personnel and the 550 square miles



The Fire Service and CrossFit

...continued from page 19



that our stations cover. Because of its online accessibility, CrossFit easily rose to this challenge.

The OCFA started formally introducing CrossFit to the members by conducting a series of three-hour classes, broken up into a classroom portion and a practical portion. The classroom portion included an introduction to the CrossFit methodology and explained the concept of scalability and CrossFit's applicability to the job of a firefighter. The consequence of not scaling to personal fitness levels (good ol' Uncle Rhabdo) were also addressed. Once the classroom portion was completed, the group headed outside for basic movement instruction. We finished the class with a workout. We offered two workouts, one for the advanced students and a scaled-down version for the moderate and intro groups. As of the time this article was written, the OCFA trainers have presented the CrossFit concept and methodology to over 200 of our 800 firefighters.

In an effort to promote a department-wide fitness philosophy, we have begun a series of group WODs held at our Regional Fire Operations Training Center (RFOTC). These workouts take place every other Friday and bring together personnel from all around OFCA. The RFOTC is centrally located in Orange County, allowing people the opportunity to attend either before duty or following a shift change. Our facility

is equipped with Concept II Rowers, Dynamax medicine balls, slam balls, 22-inch boxes (the height of the tailboard on fire engines), dumbbells, and pull-up bars.

The OCFA has seven CrossFit-certified instructors and we hope to certify our remaining 29 trainers. We are currently working with CrossFit to host a certification seminar at our training facility in 2007. Our short-term goal is to educate every firefighter within our organization. Our ultimate goal is to inform fire departments across North America and guide them so that they can improve their members' fitness and better protect their members' lives. It is this goal and our commitment to firefighter fitness that drives us to share CrossFit methodology.

We train as if our lives depend on it—because they do. ◇

Michael Contreras is the Wellness and Fitness Coordinator for the Orange County Fire Authority (OCFA) in Irvine, California. His duties include overseeing the department's 36 trainers, designing and implementing various fitness programs for over 800 firefighters and for the department's recruit academy. He has been with the OCFA for 17 years, during which time he has been a firefighter, firefighter/paramedic, and captain/paramedic. Mike is an ACE-certified fitness trainer and CrossFit level-2 instructor.



What Do We Know?

— Tony Leyland —

When Coach Glassman asked me to write for the *CrossFit Journal* on the science behind CrossFit methodology, I thought that the first thing I should do is discuss the term “science” and some important related concepts.

Science in the broadest sense refers to any system of knowledge attained by verifiable means. A central concept in science and the scientific method is that all evidence must be *empirical*—that is, it must be based on evidence that is observable by the senses. CrossFit trainers and athletes can certainly observe and measure the response to CrossFit training, but there are few other similarly intense training protocols that we can compare results with. Without this comparison it is difficult to scientifically validate CrossFit methodology. The Canadian military has done that, comparing CrossFit methods with conventional physical training methods (*CrossFit Journal* issue 41), but more such studies are needed.

The basis of the scientific method is that researchers propose specific hypotheses as explanations of natural phenomena and then design experimental studies to test these predictions for accuracy. But scientists cannot perform experimental studies on humans. In an experimental study all variables are kept constant except the variable of interest. You can do this in chemistry, for example, where everything in a number of solutions is identical except the one element under study. However, it is impossible to do in human populations.

The studies scientists perform on people are more correctly termed epidemiological, or non-experimental, studies. To do an experimental study on the effects of exercise you would have to randomly split your population into two groups that had identical lifestyles except their exercise habits. They would have to sleep the same amount, eat the same food, smoke and drink the same, etc. Strictly speaking they would have to have the same genetic make-up, as we do not all respond the same way to the same training stimulus. This is obviously impossible.

So, any single scientific study on humans must be viewed with caution. The confidence of epidemiological studies is

judged on how many studies come to the same conclusions and how strong the effect they identify is. If the effect is both very strong and evident in numerous studies, the studies’ results are considered reliable. We pretty much “know” that overloading the muscles makes them stronger because every study shows that much at least. We also “know,” because it is a very consistent research finding, that athletes reach plateaus and show reduced fitness gains if they stay on the same training regime for too long. Other than those two pieces of information, research has generated a lot of conflicting results.

The 2005 March/April issue of the National Strength and Conditioning Association (NSCA) Bulletin included a session review article titled “The End of the Single-Set Versus Multi-Set Discussion.” The article discussed a meta-analysis study (meta-analysis is a statistical analysis combining different research studies that have different methodologies) conducted by Dr. Matthew Rhea of Southern Utah University. His analysis looked at the results from more than 175 studies. Dr. Rhea found that the number of weight training sets that produced the greatest strength gains was four sets for untrained individuals; four to five sets for trained athletes, and eight sets for elite level athletes. While this study would be considered “science,” later that year at the annual NSCA national conference there were some discussions on the topic that I would, conservatively, call “very heated.”

I can understand this heated—and at times angry—debate. First, the ideal number of sets for strength gains has been an open question for a long time (more on that later). Second, and more important as far as I’m concerned, we should never say things like “the debate is over” with issues as complex as how human beings interact with their environment. The editors of the Bulletin should know better, and some NSCA members told them so. To claim that any one analysis “ends the debate” is sticking your neck out, to say the least. Moreover, the terms of the study appear to be too broadly defined to be useful, since the number of reps per set (and therefore the total volume of work) were not considered.

Epistemology is the branch of philosophy that studies the nature and scope of knowledge. Epistemology primarily addresses the following questions: “What is knowledge?” “How is knowledge acquired?” and “What do people know?” I never subscribed to the “one set to muscular failure is enough” concept, so Dr. Rhea’s study didn’t really surprise me. But the question is: Can I truly say I *know* that three or four or five or any number of sets is always better? Not really, because well controlled studies on humans are non-experimental and very difficult to conduct—and are therefore neither conclusive nor plentiful in the literature.

CrossFit focuses on optimal ways to exercise. However, we must always be mindful of the question “How do we know this is optimal?” because, to be honest, we don’t. CrossFit has arrived, in my view, at a training methodology that is incredibly effective at developing all-around fitness, as defined by the ten general physical skills that measure fitness (discussed in the free *CrossFit Journal* issue “[What is Fitness](#)”). Are there further iterations? Quite possibly? Almost certainly? CrossFit’s open-source model invites feedback, and, as more coaches and trainers get involved, additional components may well be added. ⇐

The pursuit of knowledge never wants, or expects, to stand still. It is my hope that some well constructed studies will highlight the benefits of CrossFit training compared to other methods, as well as provide information that can help CrossFit athletes fine-tune their workouts and performances. Imagine, for instance, the applications of a study that could offer some insight into the question, often asked on the website, of which work to rest ratios are most effective for certain kinds of WODs. There is already some good science out there that can help us answer these kinds of questions—and it is these types of studies that I would like to cover in later articles here in the journal.

Maybe, though, if things work and you are happy with how they work, you don’t care about science or yet another study on exercise. You could argue that any coach has to focus primarily on outputs rather than the why of things; the bottom line is: Are my athletes getting faster? Are they

What Do We Know?

...continued from page 21

getting stronger? Experience is real truth for the individual. Who needs scientific studies and fancy words like epistemology?

I can understand that point of view. But even if your athletes are improving, could they improve more? What about some of your family and friends? Are they all easy to convince of the effectiveness of CrossFit? What about the English sprint coach who once told me he has to “see the science” before changing his training methods? What about most of the strength and conditioning coaches at universities who look to the NSCA’s published studies for guidance?

My point is that many people want to see “proof,” and I think it is important that we explain the “why” of our methodologies. Simply stating “Because it works” is OK, and that’s certainly enough for some. But being able to say “This is why it works” is better. More people are going to be influenced when there are numerous studies supporting a methodology. Mark Rippetoe, in his excellent article on the squat “Going Deep” (*CrossFit Journal* issue 49) doesn’t just tell you “Get down there!”; he actually explains the mechanics of the squat and the forces on the physiology of the knee joint to explain why you should and why it works. That is the kind of information that makes people rethink assumptions.

I said I’d talk about optimal number of sets in this article. So before I finish up I’ll give you the answer. The answer is that, yes, there is an optimal number of sets—but on a given day for a given individual. I can’t tell you what it is and no coach or scientist can either. Moreover, because strength-training exercises can be used to develop cardiovascular endurance, tolerance of high lactate concentrations, skill, accuracy, etc., as well as strength, the optimum number of sets also depends on your goals. (Dr. Rhea’s focus was specifically on strength gain.)

The literature in the field includes studies showing that one set is as effective as three for developing strength, others demonstrating that five sets is most effective, others proving that the correct number is eight, and on and on. I even found one study with results suggesting that three sets of 2RM, two sets of 6RM,

and one set of 10RM reps all elicited similar strength gains. Go figure. You’d be laughed out of any gym for trying to argue that one! So how do we see such bizarre results? Just about any difference between individual trainees could affect the outcomes, and there is no way to control—or even know—all the relevant variables.

So what to do if you agree that knowing the exact optimum for any individual on any day is “unknowable”? The answer is simple, isn’t it? Do CrossFit. Do one set (“Grace”); do three sets (“Fran”); do five sets (“Barbara”); do ten sets (“Linda”). And do your sets to work all three energy systems. Do sets of exercises that require balance and skill (overhead squats, Turkish get-ups, handstand push-ups); do sets of exercises that require speed and power (cleans, jerks, sprints); do heavy strength-based sets leading to multiple 1RM lifts with long recovery periods (deadlift 3-2-2-1-1-1). Mix it up

I believe CrossFit embraces the reality that we cannot conduct true scientific experiments on humans and that we may never really know the exact how or the exact optimum. What we do know is that CrossFit is extremely effective. If others out there can show exactly how and why it works—can give some insight into what happens in the black box of CrossFit inputs and outputs—all the better. If they can show a better way, we remain open to seeing their evidence.



Tony Leyland is a senior lecturer in the School of Kinesiology, Simon Fraser University, Vancouver, Canada. He has taught at the university level for 24 years and has been heavily involved in competitive sports such as soccer, tennis, squash, and rugby, as both an athlete and a coach, for over 40 years. He is a professional member of the National Strength and Conditioning Association, a Canadian National B-licensed soccer coach, and a newly certified CrossFit trainer.

Forging Mental Fitness

Jim Decker

At the recent CrossFit certification seminar in Boston, someone asked a question that really got me thinking. I paraphrase:

I think I understand the theory behind most of the workouts—that is, strength training, metabolic conditioning, form or technique practice—but what about “Linda”? [Linda is 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 reps each of deadlift at 1.5 x bodyweight, bench-press at 1 x bodyweight, clean at .75 x bodyweight, for time.] Is that a strength workout, but with a metabolic conditioning benefit? What is the real goal?

In his response, Coach Glassman said something about how “Linda” seemed like a good workout when it was created, but it has become the most hated workout of the day (WOD). Apparently, one of every three complaints about workouts is reserved just for Linda, an impressive number since it is one of thousands of WODs created since CrossFit went online in 2001. According to Coach, anything that gets that kind of reaction has to be effective, thus worthy of repeat. I began to think about that question from a different perspective, and how I had been thinking of a different answer based on my experience as a CrossFitter and a soldier.

I believe the WODs that become significant emotional events, the real suck-fests, have a far greater benefit than the physical improvements they inflict. They require and reinforce mental strength. All WODs, when performed “as Rx’ed,” require these attributes. But Linda, Murph, Fight Gone Bad, and some of their cousins really require you to dig deep to get through them. Whether you are feeling strong and are headed to a personal record (round 1), or you are supporting a big fat boo-

Forging Mental Fitness

...continued from page 22

boo lip and are in the middle of your own pity party (round 3), the clock continues to run. It is only over when you finish that last quarter-mile, the last pull on the rowing machine, the last clean. You must find a way to get from start to finish, as best you can, solo. No one can give you a cup of fortitude, a neatly packaged perseverance bar. It must come from within.

I am endlessly fascinated and impressed by civilians who CrossFit. All the military, law enforcement, firefighters, MMA champions and the like—we CrossFit to survive. Train hard=fight hard=come home safe. Got it, no ambiguity there. But what about the teachers, the businesswomen, the engineers, website designers, and all the rest who don't (on a literal level) engage in mortal combat? What drives them to put themselves through the grueling events?

It seems to me that no external stimulus could be the answer. CrossFit is hard. People quit (some even before they try) every day because it is hard. I think the drive must be internal, a competition with oneself, a continual test of one's own limitations. This is where mental strength is born. External competition, while good and healthy, will only make you work just hard enough to beat the competitor to your left and right. Internal competition will push you farther, faster, and harder than any opponent ever will. As the man says, "Men will die for points." Even more so, it seems, when the score to beat is one's own.

In the past two years, I have had the opportunity to watch most of the elite CF athletes in action. In all of those workouts, I can't think of a single time, not once, that they looked to the studs working beside them to do anything but cheer for their "opponents." Even when gasping for breath like a fish out of water they will use that precious air for words of encouragement. But don't be fooled: there is competition going on. You can see it when the eyes glaze over, when they stop talking, hearing, even feeling. You can see them internalize. They are looking inside, calculating, strategizing, trying to control their

breathing, going to their happy place...whatever you want to call it. They are forging mental fitness. I recognize this only because I have used these same techniques, and seen them used by others throughout my career, in peace and in war.

In trying to explain this process to another person, I would break it down into four parts. The first would be to prepare yourself mentally for the upcoming challenge. Some of mankind's biggest fears (behind public speaking, of course) are fear of the unknown, fear of embarrassment, fear of humiliation. I suspect this is why so many people won't try CrossFit. They are afraid that they will fail, that they won't measure up. But measure up to what? If you've never done "Fran," then when you do decide to try it, will it not be your best time ever? Is it reasonable to think you could give Michael Jordan a run for his money at HORSE? Then why would you ever compare your "Helen" time to Kelly Moore's? Sure, read the WOD posts of someone like Matt G. with admiration, but don't compare yourself to him. I believe that when people are prepared mentally, everything else will start to sort itself out.

Second, set small goals within the event. Don't just think of the start and finish; make up several sub-goals and focus on those. In round one of "Linda," for example, don't think of the ten deadlifts. Visualize completing four reps, then three, then two, then one. Or one set of four and two sets of three. Break it up. As you do this, these mini-sets will all accumulate and you will be on the road to the next round. Think about it this way: "Helen" is not one race, but three consecutive races, each with three components. How do you eat an elephant? One bite at a time!

Third, learn to forgive yourself. If you have a bad set, or a bad round, or even a bad workout, forgive yourself and move on. Don't dwell on it. The more you agonize over screwing up your Tabata score in the sixth round or dropping the medicine ball during Fight Gone Bad, the more energy you will waste on additional stress. If the problem was preventable, note it for additional practice later and move on. If it

is something out of your control, let it go and just concentrate on doing the best you can.

Last and maybe most important, keep your sense of humor. Laughter releases stress, relaxes your body, helps lower blood pressure, and all kinds of other good things. It can make very unpleasant situations tolerable. Joking also shows you don't take yourself too seriously, which most people find pretty obnoxious.

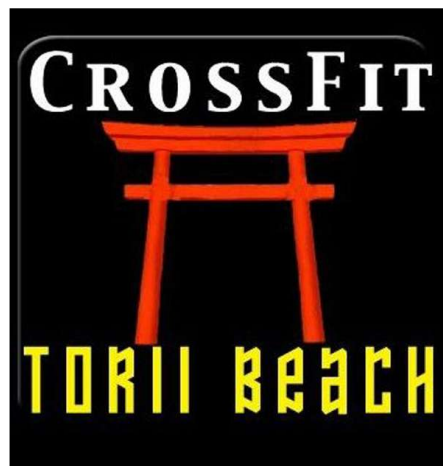
I humbly submit that all of these techniques also apply outside the CrossFit realm; try them and see how it works.

So, if I could be so bold as to add my answer to Coach Glassman's, I would say, yes, "Linda" does have a great strength-building benefit. But the most important body part being exercised is actually between your ears.



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He is CrossFit level-3 certified and is the primary trainer at [CrossFit Torii Beach](#) in Okinawa, Japan.



Gymnastics Hurdle

Roger Harrell

In gymnastics, a hurdle is the final preparatory step before performing a skill from a run. The purpose of the hurdle is to properly position yourself for the takeoff while maintaining and/or building momentum.

In most cases, a hurdle should be low and long. This will maintain forward momentum and allow sufficient time for preparatory positioning. There are a few exceptions, such as a hurdle on a diving board, where little forward momentum is available and the jumping surface is highly flexible, in which case a high hurdle is optimal.

Even if you have no plans to perform gymnastics or acrobatic movements from a hurdle, practicing a hurdle will have transferable benefit. It will improve footwork in any athletic endeavor where step adjustment is necessary, and it will improve your ability to navigate uneven surfaces rapidly and without injury.

You must know how to skip in order to have an effective hurdle. If you have not skipped since you were young, or have never skipped before, now is the time to begin practicing. Focus on keeping your skips low, long and fast. Try to travel as fast as you can while skipping. Avoid any unnecessary lifting of your legs. This will slow you down and not contribute to forward momentum. In each hop phase, bring your legs together to prepare for the next step. As you step between each hop, drive yourself forward as this is the phase of the skip that generates your speed and power. Try substituting skipping in for a running segment of a workout for an easy way to add skipping practice to your workout. The power requirement for skipping is significantly greater than running. This demand is an excellent stimulus for power development.

Forward Skip Video

<http://media.crossfit.com/cf-video/fskip.mpg>

Practice skipping backward. While this does not have direct application, you will encounter a situation where a backward skip is necessary to avoid an object or to adjust your footing to change direction while traveling backward. If you are practiced, these movements will be far

Backward Skip Video

<http://media.crossfit.com/cf-video/bskip.mpg>

easier and more effective.

Practice skipping sideways. To do this, first you must learn the sashay. A sashay is a sideways gallop. If you are traveling to the left, you step the left foot out to the side, then the left foot pushes off the ground to jump sideways as the right leg comes in to meet the left. After the jump, the right foot lands and drives to the left to repeat the process. To then skip sideways, you will need to perform a 180 degree turn between each sashay. This turn occurs just after you leave the ground in the jump. So the result will be a repeating pattern of left and right sashays. This pattern of alternating steps and hops is an excellent footwork and coordination drill.

Sideways Skip Video

<http://media.crossfit.com/cf-video/sskip.mpg>

Hurdle to step

A hurdle to step is used to set up for front handsprings, round offs, aerial cartwheels, and other skills requiring a kick. A hurdle to step sets you up for a lunge, allows for proper positioning of arms and shoulders, and maintains momentum.

A hurdle is simply a single skip into an aggressive lunge. The hop will occur on the leg that you kick when kicking into handstand. This discussion will assume that you kick with your left leg. Simply reverse all instructions if you kick with your right. Practice your hurdle from a single step.

1. Initially simply perform step-hop-step: step forward with your left leg, hop on your left leg while swinging your right leg forward (with a brief pause when your legs are together), and then step forward onto your right leg. The step onto your right leg should be a large step and drive forward. Note that the hop should be low and long, not high.

Step-hop Video

<http://media.crossfit.com/cf-video/stepnoarm.mpg>

2. Add your arms to the step-hop-step. As you hop on your left leg, both arms should swing overhead. During the hop you should be fully extended and leaning forward about 20 degrees. Your body should be in a straight line between your hands and feet. Consciously think about stretching your hands away from your feet as much as possible. This maximizes the extension in your body and will allow for a more powerful kick. As will the previous drill finish with a large step onto your right leg.

Step with Arm Video

<http://media.crossfit.com/cf-video/stepwarm.mpg>

3. Add a skill to the sequence. Perform a step hurdle into a cartwheel, roundoff, or front handspring. Focus on maximizing distance. Make the hurdle long and powerful.

Roundoff Video

<http://media.crossfit.com/cf-video/roundoff.mpg>

4. Add a run before the hurdle. Take a few steps into your hurdle. Start slow and focus on proper positioning and timing. As your timing improves, you can increase the speed. If technique degrades, slow down and back up. Far more power will come out of a slow technically correct hurdle than a fast sloppy hurdle.

Power hurdle / jump hurdle

A power hurdle is a hurdle to step that is performed from a two-leg jump. A power hurdle is used primarily as a drill to train powerful tumbling with little lead-in, but is also used when space is limited. Start standing with your legs together and arms at your side. Jump forward while swinging your arms up to fully extend your body, then land with your left leg behind you driving into a right leg lunge. As with other hurdles, the jump should be forward, not

Gymnastics Hurdle

...continued from page 24

upward. Try to cover as much distance as possible while maintaining proper mechanics.

Gymnasts should train to perform their tumbling passes out of a power hurdle. This forces a strong hurdle and round off or handspring which will improve tumbling dramatically. This also forces leading skills to be technically correct so they can build momentum rather than diminish momentum. If you regularly practice tumbling from a power hurdle, you will notice a marked improvement in your power.



hurdle to set up for the arm swing. As you step into the hurdle, swing your arms up and back so that they reach 45 degrees below horizontal, swinging back as you contact the floor. They should then be swung forward and up so that they reach about 45 degrees above horizontal as you leave the ground. The punch occurs in about 0.3 seconds, so the arm swing must be fast and aggressive.

Hurdle to two feet

A hurdle to two feet is used on vault and any two foot takeoff into a forward salto (flip or roll) skill. The general concepts of this hurdle are the same as other hurdles. Keep the steps and body positioning. This hurdle does not involve a skip; instead, it is a long low jump from one foot to two. The description below assumes a hurdle from the left foot; again, reverse all directions if the hurdle from your right foot feels more comfortable. Selection of the lead foot is not necessarily the same as that for the hurdle to step.

1. Start by practicing just the jump from one foot to two feet. Step forward with your left leg, then hop to land with both feet. Keep your arms down at your sides throughout. Try to land so that you are on the balls of your feet, your feet are in front of your knees, your knees are in front of your hips, and your torso is upright. You will be leaning back and will need to step backward after the landing.

Jumps Video

<http://media.crossfit.com/cf-video/jumps.mpg>

2. Perform a hurdle to punch. Repeat the step above, but instead of landing when your feet contact the floor, aggressively drive through the floor with your feet and punch as high as you can. You should not travel forward on the punch. It should either stay in one place, or travel slightly backward. Some forward rotation is expected.

3. Practice the arm swing. To maximize height after a punch, the arms should be swung upward during the punch. The timing of the arm swing is difficult for many. Start by just jumping using an arm swing. This is a very natural movement and most people already do this when they jump. Simply jump as high as you can swinging your arms upward as you take off. Your arms should reach about 45 degrees above horizontal as you leave the ground.

4. Include the arm swing into the hurdle punch. Your arms will complete a small circle during the

5. Perform a hurdle to punch out of several steps. Now that your timing is getting better, try to do it out of a small run. Take a few steps and hurdle and punch. Remember to swing your arms aggressively, and lean back as your feet contact the ground. This will transfer your forward momentum into upward momentum. Forward travel should be minimized.

Learning an effective hurdle is essential in gymnastics and very useful for non-gymnasts as well. The timing, coordination, and development of power will carry over into other activities. Anyone who needs to navigate obstacles efficiently will be greatly benefited by developing an effective hurdle.



Roger Harrell is a former competitive gymnast with twenty years of experience in the sport. He has continued to train in the sport well beyond his competitive years. He has run several competitive gymnastics training programs and currently focuses on coaching adults and bringing the benefits of gymnastics to those outside the usual community. He is a CrossFitter and the developer, designer, and webmaster of DrillsAndSkills.com.

Punch (no arm) Video

<http://media.crossfit.com/cf-video/punchnowarm.mpg>

Punch (with arm) Video

<http://media.crossfit.com/cf-video/punchwarm.mpg>

Kettlebell Basics

Drills for Improving Your Swing

Jeff Martone

The purpose of this series of articles is to share specific kettlebell training tips and progressions to assist the CrossFit community in maximizing the full potential of their kettlebells. The kettlebell is an extremely versatile “old school” strength and conditioning implement. Used properly, it can build functional strength, stamina, flexibility, and amazingly rehabilitate old injuries. Used incorrectly, it can aggravate old injuries or quickly create new ones. The difference is in the details.

Remember, attention to detail and mastery of the fundamentals is what separates world-class performers from the rest of the pack. It is also the key to minimizing risk of injury. The goal is to train, not maim (ourselves or anyone else).

Veteran CrossFitters are very familiar with the two-arm swing. The swing is the foundation of kettlebell exercises. You will reap big dividends if you invest a lot of time in this drill. Uncorrected technical errors in the swing will only be magnified as you progress to the more sophisticated kettlebell lifts such as the clean, jerk, snatch, hand-to-hand (H2H) drills, etc. World War II veteran Sergeant Steve Prazenka said it best: “Learn it right, and you will do it right the rest of your life. Learn it wrong, and you’ll spend the rest of your life trying to get it right... and in battle, you meatheads that get it wrong—the rest of your life will be very short.” Listed below are proven teaching progressions that will help you to learn it right the first time and address common errors before they become habit.

Rules of Engagement:

- Master each drill, in sequence, before progressing to the next drill.
- Limit the number of swings in your learning sets to 10 repetitions or less. At this point, the goal is perfect form—not a workout.
- Do not allow the kettlebell to swing higher than chest level (this is sometimes known as the Russian swing).

Note: There is a time and place

for the overhead swing (aka American swing), but not until the Russian one is mastered. The most common error with swinging to overhead is for trainees to become so focused on *lifting* the kettlebell overhead that they forget all about driving through with their hips and overcompensate with their deltoids. The tell-tale signs are the infamous “droopy bell” and “smoked delts.”

- Focus your attention on the mechanics and nuances of generating maximum power from your hips.



This article addresses proper body alignment, proper breathing, and how to effectively recruit and stretch the hip flexors. If you study and apply the training sequences as prescribed, you will be well on your way to a more powerful and efficient American Swing. (Refer to issues 20 and 25 of the *CrossFit Journal* to see why the American Swing is CrossFit’s swing of choice.)

Drills and skills

Drill #1: Wall squat

This simple drill enforces proper movement patterns and discourages bad ones. It reinforces proper back and knee alignment and forces you to keep your weight on your heels. Perform 1 to 3 sets of 5 repetitions as a warm-up. This exercise also serves as an excellent remedial drill for the bad habit of allowing their knees to track in front their toes.

1. The stance.

Begin by standing in front of a wall with your toes about 3 to 6 inches away from the wall. Keeping your feet parallel, take a shoulder-width stance. As you become stronger and more flexible, you’ll be able to perform this drill with your toes touching the wall. This is the same athletic stance you would take prior to performing a swing, deadlift, or standing vertical jump, etc.

2. The squat.

Jack-knife at the hips and slowly squat, keeping your weight on your heels. Maintain an “open” chest throughout the movement by pinching your shoulder blades together. Proper technique will keep your kisser from hitting the wall.



...continued next page.

Kettlebell Basics

...continued from page 26

Drill #1: Wall squat ...continued

3. The hold.

Hold the bottom position of the squat for 5 seconds. Feel the glutes activate, and *do not* relax into the bottom. Definitely do not let your lower back round (i.e., don't let the tail tuck under). Keep your chest open.

4. The lift.

Slowly return to the standing position. It is critical that you "lock out" at the top. In other words, your knees should be straight, quads and glutes maximally contracted. Some find it helpful to imagine pinching a coin between their cheeks (glutes).

5. The plan.

Repeat for 1 to 3 sets of 5 reps before proceeding to the deadlift.

Application: Deadlift.

Once you've established the proper "groove" with the wall squat, it's time to apply the principles to the deadlift. Deadlift the kettlebell for 5 reps. Do not worry about the weight (or lack thereof). Keep your head up, chest open, back straight, and your weight on your heels throughout the movement.

Drill #2: Hip flexor recruitment drill

This drill will teach you how to effectively engage your hip flexors during the "loading," or descending, phase of the swing. It will also teach proper back alignment and optimum hip flexor activation.

1. Begin by lying on your back. Place the fingers of each hand on the creases of your hips. This will help you feel whether your hip flexors are firing during the drill.
2. Raise your feet off the ground and flex your feet back toward you. If you have a partner, have him hold your feet by grabbing the top of your foot with a thumbless grip, palms down. You won't get the right stimulus if he holds your feet by the heels with palms up. If a partner isn't available, use a resistance band to assist (see photos).
3. Starting with your legs straight, feet flexed, slowly bring your knees to your chest. The band or your partner is to provide a little resistance. Properly executed, the hip flexors should feel like they are cramping by the time your knees make it to your chest. Hold this contraction for about 3 to 5 seconds and make a mental note of that sensation.
4. Repeat 3 times. Take a short break and then proceed to the wall squat.

Application: Wall squat

Go back to the wall and perform one set of 5 reps of the wall squat. This time purposefully engage the hip flexors every time you descend. In other words, *pull* yourself down "into the hole." Don't just yield to gravity. If you can't feel your hip flexors firing, repeat the hip flexor recruitment drill until you can. Shake out any tension, and then proceed to the deadlift.

Application: Deadlift

Deadlift the kettlebell for 5 reps, actively engaging your hip flexors. Proceed to the swing.

Application: Swing

Perform a set of 8-10 Russian swings. Start with very low swings and gradually build up the height with every rep. Keep your chest open, arms straight, shoulders relaxed, and allow the kettlebell to swing freely.



Kettlebell Basics

...continued from page 27

Drill #3: Hip flexor stretch (shoulder bridge)

Here are two great stretches that will help unlock the full power of your hips. Tight hip flexors are reaching epic proportions in twenty-first-century America. All the time people spend sitting causes neural shortening of the hip flexors, which in turn causes us to short stroke our swing. The end result is loss of power. This drill will help you find and get rid of these power leakages.

Stretch #1:

This drill will dramatically increase your ROM (range of motion) and power output. The total time invested is less than a minute. So, get ready to release the “parking brake” and unleash the power.

1. Lie on your back, with your feet flat and heels close to your glutes.
2. Place a small medicine ball between your knees and squeeze hard.
3. Perform a shoulder bridge. Slowly raise your hips toward the ceiling, keeping your shoulders and head on the floor. Hold for five seconds, and then relax as you return to the starting position.
4. Repeat 3 to 5 times.

Stretch #2:

Here is a more powerful variation of the previous stretch and my personal favorite. However, if you have acute lower back problems or are obese, you may want to stick with the previous stretch. This type of stretch will yield better gains in less time. Perform steps 1 through 3 as you did in Stretch #1. This time, add a 5- to 10- second isometric hold at the top position. More specifically:

1. When your hips reach the limit of your ROM, place the fingers of each hand on the front part of your hip bones. Keep your arms tight against your body and apply downward pressure by driving your elbows towards the ground. Maintain that position and be sure to maximally contract all the muscles of your lower body (i.e. glutes, quads, hamstrings, etc.) for 5 to 10 seconds.
2. Release your fingers off your hips and exhale (out your mouth), while continuing maximal glute contraction. Executed properly, your hips should float to a new ROM. The harder you hold the isometric contraction, the greater the ROM gain will be when you release the hold.
3. Repeat this drill 3 to 5 times.
4. Immediately stand up. You should notice an immediate change in your posture when standing. You will feel taller as your posture returns to its original vertical alignment.
5. Proceed to the deadlift.

Application: Deadlift

Deadlift the kettlebell for 5 reps, actively engaging your hip flexors. Now proceed to the Russian swing.

Application: Russian swing

Perform a set of 8 to 10 Russian swings. Start with very low swings and gradually build up the height with every rep. You should feel an immediate sense of freedom of movement and power from your hips. If you do not feel more power from your hips, then repeat the above sequence then practice a few standing vertical jumps. This should yield noteworthy results



Article continues next page.

Kettlebell Basics

...continued from page 28

I cannot overemphasize the importance of these drills. They will serve you well if applied prior to each training session or WOD.

Breathing tips

Proper breathing is essential for safety and maximal power. However, it is commonly overlooked and often not emphasized.

It is important to develop the habit of inhaling as 75-100% of your lung capacity prior to loading your muscles (i.e., lifting). Inhale through your nose on the descent prior to the deadlift or while descending during the swing

Rather than exhaling all of your air at once, forcefully exhale a tiny stream of air through your clenched teeth, while pressing your tongue to the roof of your mouth. This will contract the diaphragm and the muscles of the abdominal cavity and increase your intra-abdominal pressure thus increasing the stability of the trunk and the transfer of force through it. On the upward portion of the swing, exhale a little bit of air, similar to a fighter exhaling on contact.

Make drill #1 and drill #3 a part of your daily routine. Employ proper breathing in all exercises. The difference is in the details, so work toward achieving perfect form. Think of each training session as just that: a "training" session, not a workout. Once you've mastered the kettlebell swing and these basics, you'll be ready for the many variations and challenging routines that I'll discuss in future articles.



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A New, Rather Long Analysis of the Deadlift

Mark Rippetoe

Many years ago I was strong. Well, relative to what I am now, I was strong. It is a rather dim memory, but I have pictures and trophies that I am told are mine. At the time, I was a decent deadlifter, usually among the last few even in our state-level meets to open, usually with something close to 600 lbs. My PR was 633, done on two separate occasions at a bodyweight of 220. The deadlift was really the only thing I did well, at least on the platform. My training buddies and I trained it hard, probably twice as much as other lifters spent on the lift.

In the early 1980s there were no deadlift "suits"; we wore plain wrestling singlets. Wrestling shoes had just become popular; the reasoning being that the shorter heel decreased the distance that the bar had to be pulled. I found that I could pull better in my squat shoes, with the heel helping me more effectively push the bar away from the floor using my quads in the initial knee extension. We were doing an exercise called halting deadlifts that involves only this initial push off the floor. Haltings start from the same position as the deadlift, with the back locked and the shoulders in front of the bar, and come up to a point right above the kneecap. The keys to the halting are the push of the feet against the floor—the knee extension—and keeping the shoulders out in front of the bar, which, when done correctly, can be felt in the lats almost as much as chin-ups. This is important, although at the time I didn't know why.

We also began using another exercise we called the rack pull. Haltings work from the floor up, and rack pulls fill in the top part of the pull. They start from pins set inside the power rack right below the level of the knee, at about the tibial tuberosity, and move up through lockout, finishing in the same position as the deadlift. The emphasis in the rack pull was the locked back and the hip extension, with an attempt to actively exclude any knee extension from the movement. The start position for the rack pull is also

puts the shoulders out over the bar, but when the bar comes up past the knees, the chest comes up as the hips begin to bring the back into the vertical finish position. The overlap between the two movements at the knee ensured that there was no "hole" in the training of the full deadlift with these two partial exercises. We didn't feel the rack pull in our lats that much, with me again not knowing why, or even thinking about it.

But two very good questions can be asked here. In both exercises, the start position involves the shoulders being in front of the bar, which is to say, on the other side of the bar from the rest of the body. The interesting thing about this position is that when you're in it, your arms are straight but not actually vertical. They are at about a 10-degree angle from vertical, because the shoulders in front of the bar have them reaching back to the bar at this angle. But it sure seems as though they would almost *have* to be vertical since a damned heavy weight is hanging from them. Shouldn't they hang straight down?

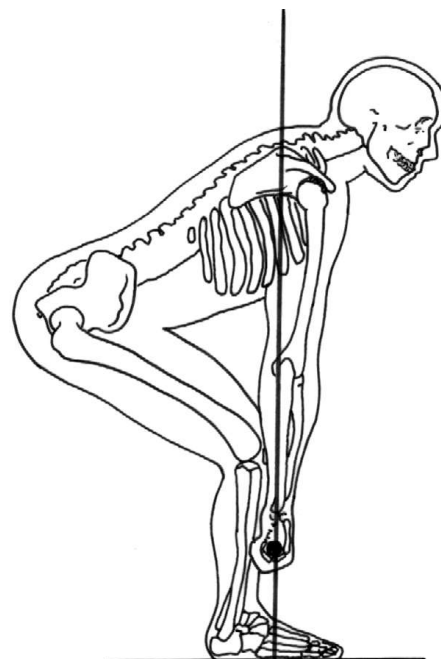


Figure 1 The relationship of the scapula and the bar in the deadlift starting position.

A New, Rather Long Analysis of the Deadlift

...continued from page 29

And another thing: shouldn't the back be as vertical as possible, since vertical is easier on the back? If the shoulders are out in front of the bar, the back will most assuredly not be very vertical. It might even be nearly horizontal, almost parallel to the floor, if you have short arms or long legs. But vertical is easier, because the more vertical the back is, the less torque, the rotational force applied against the lower back, will be produced. In a system in which mean old Mr. Gravity provides the force directly downward, the closer to vertical the force is applied, the less the force is converted to torque. Torque is 100% of the force when applied at 90 degrees—i.e., with your back bent over parallel to the floor. And there is no torque when the force is applied parallel to the lever arm, when the back is vertical, where all the force is simply compression. The closer to vertical the back is, the smaller the effects of the lever arm formed by the rigid back with a weight hanging from the top of it.

The answer to both is no. The arms cannot hang straight down; they must be at an angle from the shoulders back to the bar, and the back cannot be vertical if the shoulders are in that position. But why is

this true?

This has bothered me for years in a very quiet little squeaky way, the question usually behaving itself and not demanding an analysis. Recently I have been dragged to the board and forced to think about it more thoroughly.

The force that is transferred from the back to the bar doesn't just leap over to the arms through the air. It is transferred to the arms through the shoulder blades, and it just so happens that when the correct deadlift position is assumed, the shoulder blades—not the front of the deltoids—are in fact directly over the bar in a line perfectly plumb and vertical to the bar. Let's review the basic force-generation mechanics of the deadlift and see if this makes any sense.

The force that makes the bar go up is generated by the muscles that extend the knees and the hips, and this force is transferred up the rigid spine, across the scapulas to the arms and down to the bar. The weight leaves the floor when the quadriceps extend the knees, but for this to happen the hamstrings and glutes must anchor the hip angle in its position. The hamstrings pull down on the pelvis from below, and the glutes hold it from the top of the iliac crest; if the back stays flat this allows the force to travel up the rigid back held at a constant angle while the quads push the floor. This knee extension can then provide the initial drive off the ground. If the hamstrings and glutes fail to hold their position during this initial push, the quads don't contribute to the movement of the weight since they straightened out the knee without any movement of the load. When this happens, you just shove your butt up in the air without the quads lifting any of the weight. When the lift is done correctly, though, the hip angle opens only very slightly as the bar rises to the knees, and the back angle—the angle the torso makes with the floor—stays constant. During this process, the quads move the weight, the glutes and hamstrings hold the hips down, and the flat back transfers this force up to the shoulder blades and down the arms to the bar. If the knees extend without moving the bar (pushing the hips

up into the air), the movement becomes a stiff-legged deadlift, with the glutes and hamstrings doing the work without the help of the quads.

At this point, the bar must be as close as possible to the middle of the foot (with the feet flat and heels down, of course) where the force acts against the ground: it must be in contact with the shin. In fact, it must stay in contact with the legs all the way up to lockout, since the farther away from the knee and hip joints it is, the longer the lever arm—the back—is, producing more torque against the hips. The correct starting position for any pull from the floor is *always* one in which the bar is in contact with the shins. This is another problem with raising the butt up without moving the bar: the knees pull back as the butt raises, pulling the shins away from the bar and leaving it too far away from the point of ground reaction.

In the correct starting position, the scapulas are directly over the bar. This is because the force transferred up the spine is distributed to the scapulas from the ribs against which they lie flat, sprung from their posterior attachments against the spine and supported through their curvature around to their anterior attachments on the sternum. They are

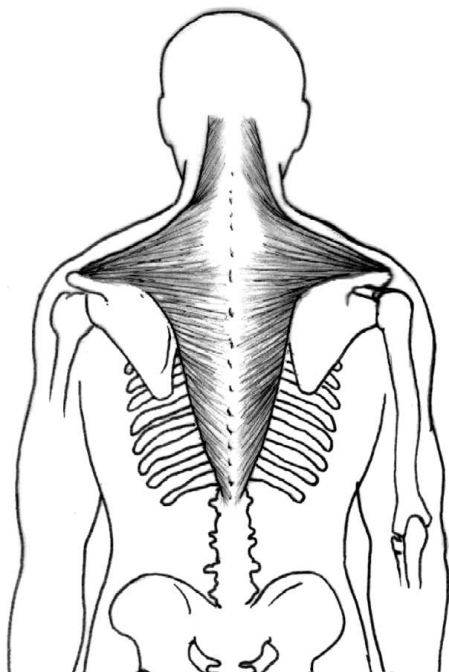


Figure 2 Trapezius anatomy.

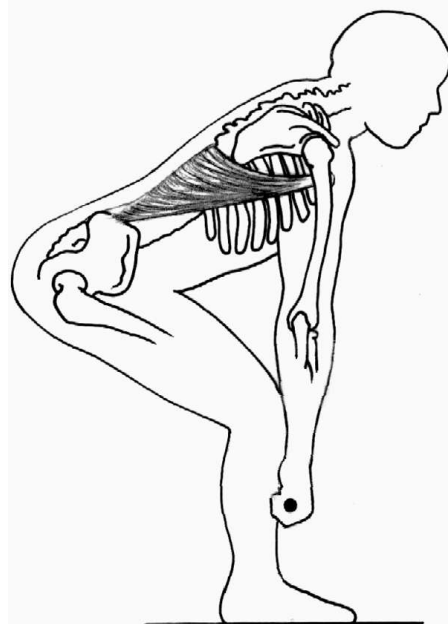


Figure 3 Anatomy of the lat, and its position at the start of the deadlift.

A New, Rather Long Analysis of the Deadlift

...continued from page 30

held fast by the trapezius muscles, which attach the spine of the scapula—the long bony ridge extending down the length of this otherwise broad, flat bone—to the vertebral processes along a broad origin that extends from the top of the neck well down the middle of the back, and by the rhomboideus muscles, which form a narrower attachment between the medial edge of the scapula and the spine. The scapulas have only a muscular attachment to the back; they float within their muscular base to allow a range of shoulder position. The retracted position, the one in which they are pulled closest to the spine, is the position of maximum muscular tension, and maximum support from the traps and rhomboids. It is the position in which they can most effectively receive the force from the back for transfer to the arms. At the start position the inferior part of the muscle, the part farthest down the back, is the main contributor to the retraction of the scapulas (the upper part becomes important at the top of the deadlift).

The shoulder blades are the skeletal components that receive the force from the back and change the direction of the force from parallel to the back angle to one that connects with the bar. So they are the components that conduct the pulling force of the lifter to the gravitational force that the deadlift must overcome. Gravity acts perpendicular to the floor, so the scapulas must be perpendicular to the bar, because the weight actually hangs from the scapulas.

Of course, this position is ultimately dependent on the ability to keep the spine in rigid extension during this process. If the muscles that keep the spine rigid are not contracted properly or are overcome by the load and pulled into a position where the spine is rounded, two problems result. First, the intervertebral discs are not designed to bear weight effectively anyway. This bipedal stance we occupy is rather poorly thought out, and discs are better at just separating bones than forming a weight-bearing surface between them. They only bear weight well when they are in the correct position, where the surfaces of the vertebrae they separate

are oriented in the way the disc is shaped for them. This position is achieved when the back is in extension, both lumbar and thoracic. This is the normal anatomical position for the back, and the one in which the spine must be maintained by the back muscles during a deadlift or any other lift involving force transfer up the spine. Maintaining this position prevents injuries.

Second, if the back fails to maintain extension during the deadlift, some of the force that would have gotten to the bar gets absorbed in the lengthening muscles, and lifting efficiency is reduced. If the back rounds enough, an erect position cannot be attained at the finish, since the function of the spinal erector muscles is to maintain rigid extension, not to actively extend under a load. So, the correct starting *and* maintaining position for the back is *always* one of spinal extension for the whole back. There is shearing force applied to the spine during the deadlift, and it is overcome by the isometric contraction of the spinal erector muscles working with the intrathoracic and intra-abdominal pressure generated by the anterior trunk muscles. This is why the deadlift is regarded as the best back exercise in existence.

In their retracted position, the scapulas lie at an angle that puts the glenoid—the socket that articulates with the ball of the humerus—slightly forward of the

spine of the scapula. This means that in the deadlift starting position, the top of the arm at the shoulder will be slightly forward of the scapula. If the scapulas are directly over the bar and the shoulders are slightly forward of it, there is a slight angle from the shoulder to the bar, and the arms will not be vertical. This is where the lats become important. If the shoulders are in front of the bar, the back is flat, and the bar is touching the shins, this angle is inherent in the position. Tension from the lats keeps the bar from swinging away from the shins into a difficult pulling position. The lats keep the bar vertically under the scapulas so that force can transfer to the bar in an anatomically efficient way, and so that the distance between the bar and the point of ground reaction is the shortest.

The lats are good at this. They attach near the top of the humerus along a broad, flat insertion, and in the starting deadlift position the most lateral fibers of the muscle are at about 90 degrees to the bone. This is a very efficient position for maintaining tension on the bone. If you tie a long rope between a tree and a car, you can pull the car by pulling on the rope at a right angle—90 degrees—to the rope. This works best if you are in the middle of the rope, but we are not trying to actually *move* the bar back, just keep it against the shin until the bar is above the knees. The halting deadlift, since

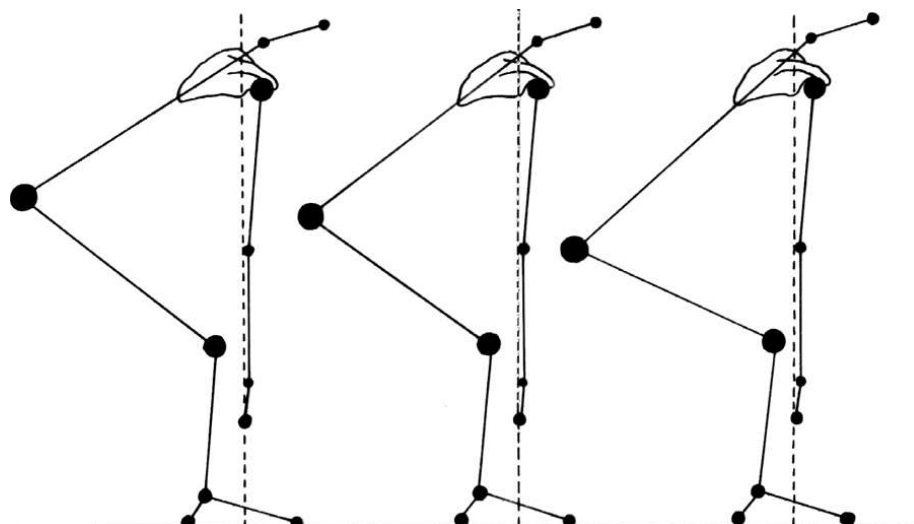


Figure 4 The effect of different variations of back/femur dimensions on back angle in the deadlift starting position.

A New, Rather Long Analysis of the Deadlift

...continued from page 31

it works the part of the motion that involves this lat function, has a profound effect on lat strength and development when done with heavy weights.

Once the bar passes the knees, the knee angle has opened up quite a bit and the hip angle begins to open as the function of the hamstrings and glutes changes. As the bar rises above the knees, the torso becomes more and more vertical as the lift gets closer to the finish position. The hamstrings and glutes begin to actively extend, or open, the hips, changing both the hip angle and the back angle. At this point, most of the knee extension is finished and the hips are catching up. During this phase the scapulas rotate back to a position behind the arms as the chest comes up. They have moved from directly over the bar to behind it as the torso becomes vertical, and the traps change their support from the inferior portion of the muscle to the superior, the part visible above the shoulder. The lats drop out of active participation in the lift since they are no longer required to keep the arms from swinging away forward. As the lockout portion of the lift is approached, the knees and hips have both moved through the hard part of their respective ranges of motion, a little more being left for the hips to do than the knees. Their final lockout will occur simultaneously. At lockout, the shoulders are back, the knees and hips are extended, the spine is in normal anatomical position with chest up, face straight forward, lower back locked, and everything stable.

What this boils down to is that there are exactly three criteria for a correct starting position for the deadlift:

- 1) The back must be locked in extension.
- 2) The bar must be touching the shins, with the feet flat on the floor.
- 3) The shoulders must be out in front of the bar so that the shoulder blades are directly above the bar.

It doesn't matter what the individual looks like in this position as long as these three criteria are satisfied. Legs may be long or short, the back may be long or short relative to the legs, arms may be long or short, a kyphosis may be present, and these factors will all influence the appearance of the starting position, primarily in terms of varying the angle the back makes with the floor. But as long as all three of the criteria are satisfied, the starting position is correct. As a coach, you should become familiar with the effects of the anthropometric variables on starting position, and learn to tell wrong from merely weird.

In both the halting deadlift and the rack pull, the shoulders start out in front of the bar, because both exercises start with the bar below the knees, when the scapulas are still over the bar. The halting stays in that position all the way up and down, whereas the rack pull rotates out of it shortly after the knee is cleared. And now I know why. And I'm as sorry as you are that it took so long to explain.

Mark Rippetoe is the owner of **Wichita Falls Athletic Club** and **CrossFit Wichita Falls**. He has 28 years experience in the fitness industry and 10 years as a competitive powerlifter. He has been certified as an NSCA Certified Strength and Conditioning Specialist since 1985 and is a USA Weightlifting Level III Coach and Senior Coach, as well as a USA Track and Field Level I Coach. He has published articles in the *Strength and Conditioning Journal*, is a regular contributor to the *CrossFit Journal*, and is the author of the book *Starting Strength: A Simple and Practical Guide for Coaching Beginners* and the forthcoming *Practical Programming for Strength Training*.

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The Grinder

CrossFit FRAGO #4, "YBF"

The Grinder: CrossFit FRAGO #3, "YBF"

CFHQ
Santa Cruz, CA
USA

01 Nov 06

OPS 05

FRAGO 04 to OPORD 01 – OP GRINDER

Ref: A. OPORD 01 01 Jul 06

Task Organization: Annex A

1. SITUATION. No Change.

2. MISSION

"YBF": 3 rounds for time: 21, 15, and 9 reps of double-unders, thrusters, ring dips, squat cleans, and deadlifts

3. EXECUTION

a. Concept of Operations.

- (1) Intent. Complete three rounds of the exercises as quickly as possible in a safe manner. This is a five-man-team, "task-specific" workout. The team's time ends when the last member of the team completes the workout. The purpose of this workout is to develop cohesion and combat fitness under fatigue conditions through shared hardship, challenges, and competition.
- (2) Scheme of maneuver. The platoon will be divided into as many teams of five as possible. Each team will require a skipping rope, a sand bag, rings, a 45-pound rock, and two .50-cal. ammo cans. All the teams will start at the same time. Each team member has a specific exercise to perform. Each soldier will be doing double-unders, thrusters, ring dips, squat cleans, or deadlifts. Once each soldier has completed his required reps of the exercise, the team will rotate together (Ann A). This rotation will continue until each soldier has successfully competed three rounds of each exercise. The first round will end when each soldier returns to the station he began at. Rounds 2 and 3 are executed in the exact same order. Spotting is not permitted at any time.
- (3) Main Effort. The safety of all personnel and the development of unit cohesion and combat fitness through shared challenge and hardship.
- (4) End State. The safe and successful completion of all three rounds by each individual on the team.

CrossFit FRAGO #4, "YBF"

...continued from page 33

b. Coordinating Instructions.

- (1) Team Organization. Platoon leaders can organize each team however they want. It is a leadership decision on how best to deploy each team to accomplish the mission.
- (2) Scaling. The workout can be conducted in PT gear or full battle gear to include vests with plates, depending on the fitness levels of your soldiers. The five pieces of equipment required—skipping rope, sand bag, rings, rock, and ammo cans—are for austere conditions. If you have the resources, you can use an Olympic bar or dumbbells, of equivalent weight, for the thrusters, squat cleans, and deadlifts. The weight of the equipment or number of reps can be increased or decreased based on the skill level of your troops.
- (3) Scoring. The finish times for each five-person team are recorded. The team or squad that has the quickest time comes in first.
- (4) Safety. Ensure that all equipment is checked and serviceable before conducting the workout and that all soldiers are proficient in the required exercises. Safety is every member's responsibility.
- (5) Follow-on Tasks. The next workout will require a 1.5-km running route, one climbing rope, one set of rings (austere or regular), and two pull-up bars, as a minimum, per eight man team.

3. SERVICE SUPPORT

a. Equipment Weights

Item	Quantity& Size	Type	Weight	Content
Sand bag (or rock)	14 in _ 26 in	8105-00-142-93	50Lbs	Sand
Cart. Cal .50	100 Rds	50Lbs	50Lbs	Sand
Nylon Webbing, weave, tubulate plain weave, tubua	N/A	8305-21-111-5411	N/A	N/A.

- c. Time Recording. One stopwatch and writing material to record each team's time.

4. COMMAND AND SIGNAL

- a. Timer/Score Recorder. Only one timekeeper is required for all squads. All five-man teams begin the workout at the same time. When teams complete all the exercises, they inform the timekeeper, who records all times. It is recommended that at least one person

CrossFit FRAGO #4, "YBF"

...continued from page 34

per team start his stopwatch to act as a backup in case the primary timekeeper's stopwatch fails.

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

Annexes:

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

Annex A Workout Diagram

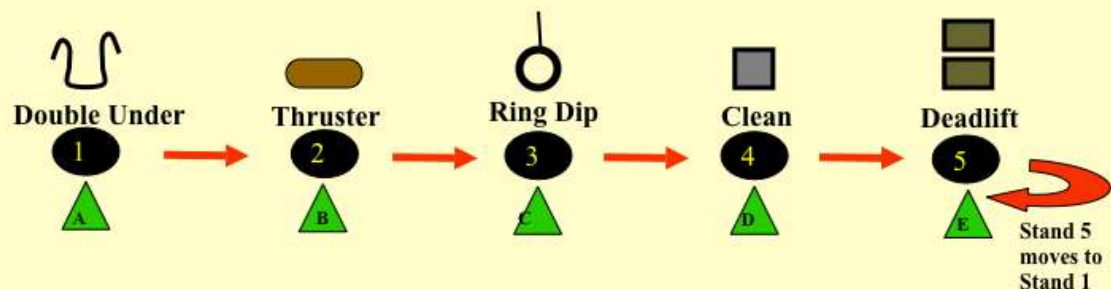
Annex A

To FRAGO 04

01Nov 06

YBF: 3 Rounds for time of 21, 15, 9 reps

Five-Man Team Layout



LEGEND

-- Sandbag

-- Skipping Rope

-- Rings

-- Soldier

-- Team Rotation

-- Exercise Station

-- 45 Pound Rock

-- .50Cal Ammo Can

CrossFit FRAGO #4, "YBF"

...continued from page 35

Annex B Equipment



Annex C Exercises

