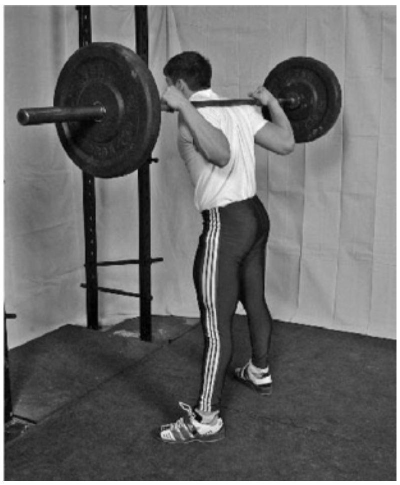
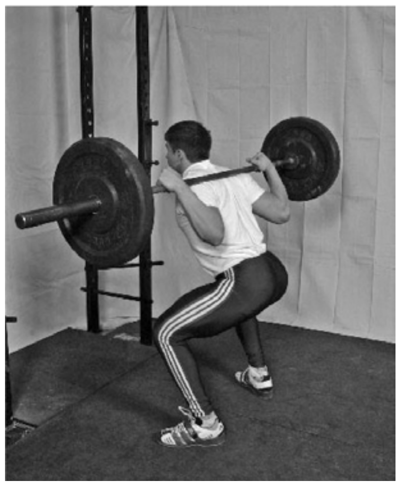
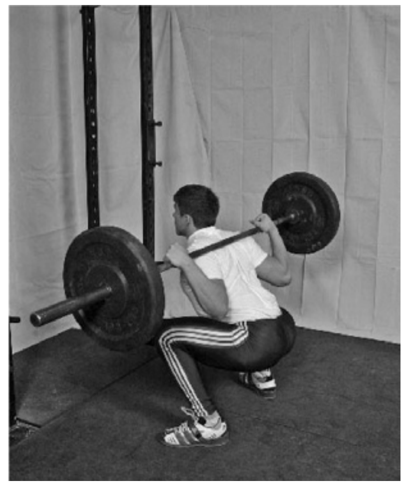
the CrossFit Journal Articles

The Slow Lifts

Mark Rippetoe







The "slow lifts"—the squat, the press, the deadlift, and the bench press—form the basis of any effective program to improve strength. And strength is very important. It is the difference between a very successful varsity athlete and a bench warmer, an independent older person and a nursing home resident, a correctly chosen gym membership and a waste of money.

When I was a little boy, my daddy took me to work with him at his café. He worked long hours and would never have gotten to see me if I hadn't gone back to work with him in the afternoons, after his well-deserved and often interrupted nap. One of my favorite people to see at the café was the shoeshine guy from the barber shop on the corner. Roosevelt Pope was in his fifties at the time, and, had social conditions differed in the early 1930s when he was young, he would have been an amazing athlete. As I remember, he was about 5'10" at probably 190 lbs., with an athletic bearing and a broad sense of humor. Roosevelt had really nice arms, but I don't know if he trained them. At the time I didn't think to ask.

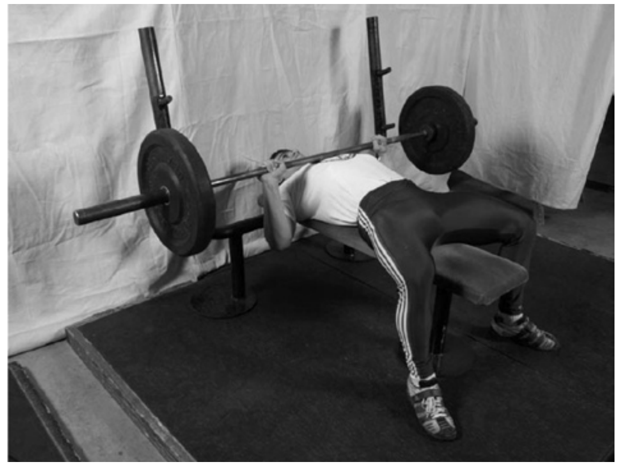
I was always fascinated by Roosevelt's hand strength, and the things he would do to show me. He could take a stuck lid off of a jar that would embarrass my dad. He could bend a bottle cap between his thumb and his ring finger. He could do other things that I don't remember at 45 years' remove, but the impression he made on me was one of confidence and power that elevated him in my esteem well above the position the social circumstances of the day would otherwise have dictated. And he was a nice man to boot. He brought me bubble gum without my even having to get a haircut.

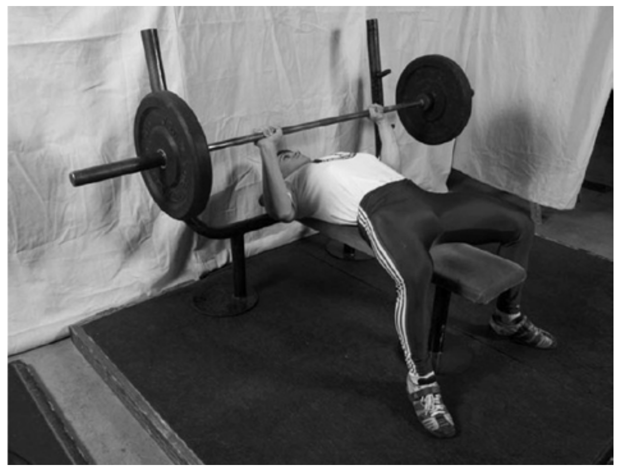
I look back to 1961 and I see clearly that strength means way more than the ability to generate force against a resistance. It has always meant capability. It has always been the means by which people accomplished things in interaction with their environment. Its acquisition has always improved the acquirer in more ways than intended.

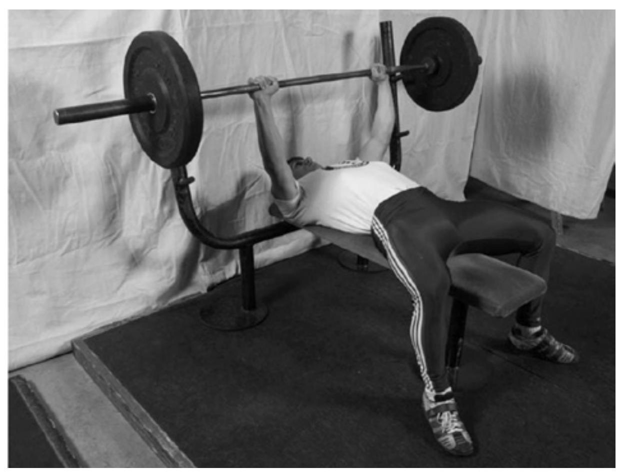
Strength is the ability to generate force against a resistance, irrespective of the movement produced by doing so. If the resistance doesn't move at all, the force exerted against it is still measurable with the right tools, and the muscular effort used is said to be "isometric," wherein the muscles stay the same length. If the movement of the resistance is controlled by something other than the muscular effort (by the exercise or measurement device, since this cannot occur otherwise), the movement is said to be "isokinetic." This is a silly thing, like a quadriceps isolation, since it does not occur in nature, or under any circumstances the human body is designed to accommodate.

When we consider movement that is controlled by the muscular force applied to the resistance, power becomes an important concept. Power is force applied to a resistance that causes the object providing the resistance to accelerate, or change velocity. Force applied to a stationary force plate is a measurable quantity, but it is not power. Movement is required for power to exist. In the weight room, if the weight on the bar stays the same, the bar moves faster when more power has been applied to it. If the weight gets lighter, it's obviously easier to move faster, so power would depend on how much faster it gets moved. As the resistance or weight decreases, the lifter's power output decreases as well, due to the inability of a human to continue to move and object faster and faster as its weight decreases. (Humans have inherent limitations in the nervous system and the contractile mechanism of muscle tissue that machines don't have, and as the weight approaches zero this limit velocity takes less and less force to achieve.) The same is true with increasingly heavy weight, but as the weight increases to the point where it's too heavy to lift at all, power decreases all the way to zero, since movement is required for power. At a 1RM, force is very high, while power is very, very low. Powerlifting really is misnamed.

Power—the ability to accelerate—may be the most important ability to display in all sports, even those involving only the accelerated movement of the body, such as gymnastics and diving. In two athletes with exactly the same skill level, the more powerful of the two will be the better athlete, since the more powerful one can utilize those skills more efficiently.







In all of sport, the highest power outputs ever measured occur during the second pull of the snatch. I would guess that the lowest would occur in the posedown at the Mr. Olympia, but I may be wrong.

Strength contributes to power by providing the force involved in the acceleration, which is obvious. Equally obvious is the fact that strength improvement will improve power, although there are other factors involved that depend on the efficiency of an individual's nervous system.

Less obvious is the subtle role that strength plays indirectly in the execution of the movements that depend on power, both sports skills and power-dependent training exercises. In all expressions of power, there are elements of the kinetic chain that generate the force that produces the acceleration, and there are elements that transfer the force to the resistance.

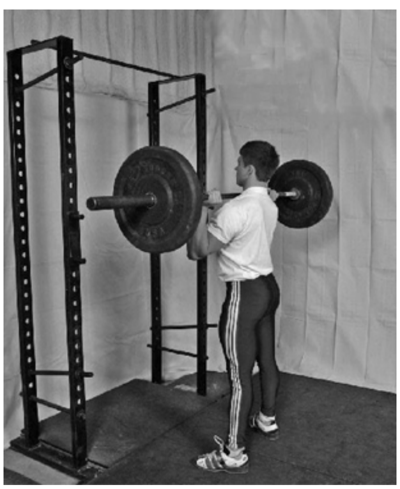
For example, in a clean the power is generated by the extension of the knees and hips at the feet against the ground, and it is transferred up the back and down the arms to the bar. The efficient transfer of power along the trunk segment is possible only if the muscles that stabilize the trunk are able to hold it in perfect isometric contraction during the transfer. Any laxity in the back causes some of the power that would ideally get to the bar to be absorbed elsewhere. In the same way that towing a car with a long spring is not as good an idea as using a chain, a mobile body segment absorbs force that an immobile segment would transmit.

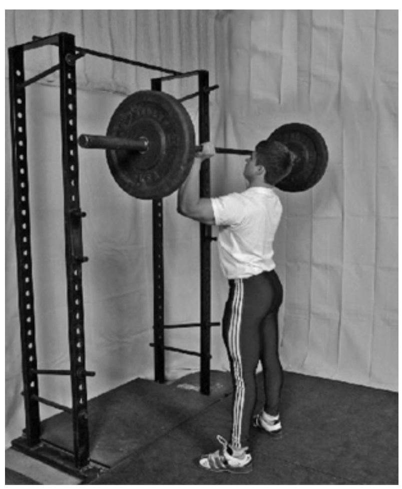
The muscles that hold the segment immobile are therefore critical to its function in the kinetic chain. A loose back during the clean produces an unfinished pull, as well as an unpredictable bar path, since varying amounts of force get to the bar. And the muscles' ability to hold an isometric contraction depend on their ability to produce sufficient force to hold all the mobile segments of the vertebral column perfectly immobile while a tremendous load is trying its best to move them. That ability to produce force is strength.

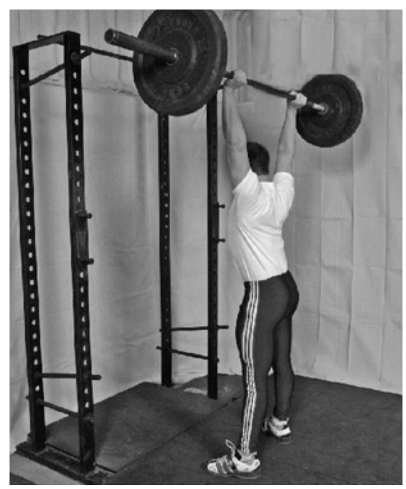
The squat, press, deadlift, and bench press all incorporate the isometric and dynamic components of the quick lifts—the snatch and the clean and jerk—because they are multijoint movements that involve lots of muscles doing lots of things during the movement. The slow lifts can all be done fast themselves, and can therefore be used to develop power as well as strength. Louie Simmons didn't invent the idea, but he taught us the lesson.

In contrast, the quick lifts cannot be done slow, and are always used to train power. They cannot be used as strength exercises, since their execution requires a high bar velocity: a slow snatch will not rack; a slow clean is a deadlift. The squat can be done with heavy weights that preclude high velocities, but it requires high force levels, and so allows force production to be trained. In novices, any movement that uses weights that are heavier than have been lifted before can produce strength increases, since they are thoroughly unadapted to force production, and the isometric effort used in the clean and snatch will develop strength in these people. But in more advanced lifters the quick lifts are not useful for developing strength, since strength is not the limiting factor in their execution.

Of greater interest to the general public is the relationship between strength and endurance training. The media, damn near all of it, in collusion with doctors, physical therapists, athletic trainers, "exercise physiologists,"







high school coaches, the ACSM, the YMCA, Dr. Phil, Jake, Tony, and various other experts, have all managed to equate fitness with aerobic exercise. The cruel fact is that strength training contributes mightily to endurance/aerobic training, and endurance training contributes essentially nothing to strength training.

Here's why. Let's take the example of a cyclist riding in the Hotter 'N Hell Hundred, which is after all the largest sanctioned bicycle race in the world, right here in Wichita Falls, Texas. This cyclist, riding down the mind-numbingly flat roads of Wichita County, will be able to maintain a speed of about 18 mph for an agonizingly extended period of time in the sweltering August morning, unless he is killed prematurely by an inattentive oilfield worker driving onto the road, blinded by sweat and dust. This poor bastard is able to maintain his 18 mph pace by applying a uniform amount of force, x pounds, to each pedal stroke. (Let's ignore that fact that he uses a complicated circular stroke, and just assume that he is pushing his pedals like most everybody does on a bicycle.) Let's say that we force him to do the unthinkable and perform a correct squat in order to assess his lower body strength. After much whining about his knees and how the squat doesn't really correctly simulate the range of motion of cycling, he manages a 1RM with 135 pounds. So his pedal force constitutes a percentage of his squatting force, x/135. (This 1RM deal is just for the sake of illustration. I am a moral man, and I would never test a cyclist, or any other untrained squatter, at 1RM.)

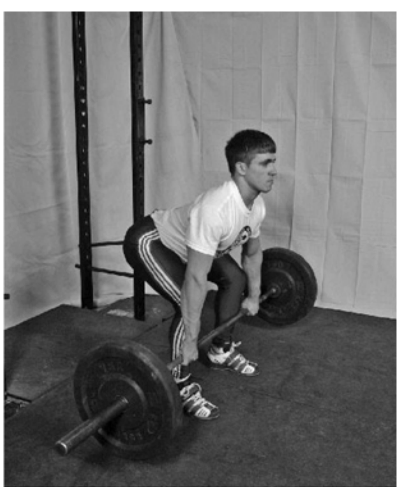
Now, we blackmail him into training the squat for 8 weeks by threatening to release the pictures we took of him squatting. After an initial period of easy work to allow time for him to adapt to the unfamiliar eccentric component of the training—which is absolutely necessary when training cyclists—he increases his 1RM squat from 135 pounds to 270 pounds, a doubling of his effective leg strength.

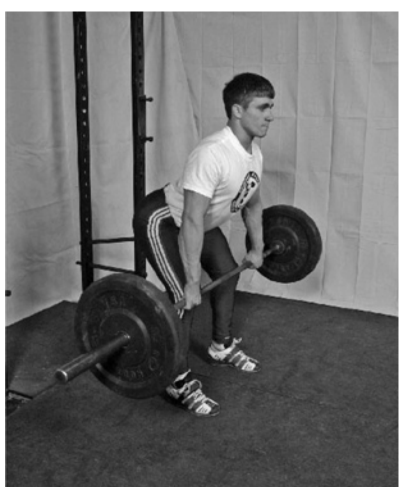
What happens to his pedal force at 18 mph as a percentage of his max squat? It goes from x/135 to x/270. It is reduced by half. Because leg strength doubled, it now takes half of his previous force production capacity against the pedals to maintain the same 18 mph pace. He is stronger, and so he doesn't have to work as hard to do the same work.

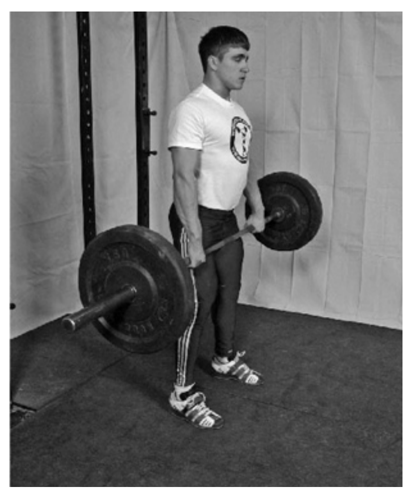
This analysis applies at some level to every activity that requires repeated submaximal contractions. By lowering the relative intensity of each individual effort, the cumulative effort is reduced, and depending on the range of motion of the activity, may even be shifted farther toward the oxidative end of the metabolic continuum, which fuels long slow distance efforts.

Although squats and all the other slow lifts depend on the phosphocreatine/glycolytic energy regime, they have the ability to positively influence activities that are primarily oxidative in nature. By increasing strength and improving the efficiency of each component contraction, strength training makes an important contribution to every type of athletic activity.

But what about endurance training's benefit to strength training? There is none. Activities that utilize oxidative metabolism do not depend on force production, and so do not produce strength. Anything you can do for an uninterrupted two hours can't be that hard, in terms







of the amount of force required. It produces endurance adaptations at the cellular level, changes that are actually detrimental to strength. Long slow distance work destroys muscle mass, beats the hell out of your knees and hips, and takes way too long. Don't do it.

So, you ask, why do we squat, press, deadlift? Because these lifts work all the muscles and joints in the body, they simulate normal human movement patterns, and they produce strength appropriate to all uses of the muscles and joints. They can be trained fast or slow, done with a minimum of equipment, and form important components of the quick (i.e., Olympic) lifts. They affect the body in a systemic way, producing sufficient stress that a hormonal response is produced to facilitate recovery and adaptation. They are very hard. They produce psychological toughness when trained correctly. And absolutely no one has ever gotten brutally, ungodly strong without doing them. What about the bench press? The bench press is inferior to the (overhead) press as an overall exercise, but it does allow for the development of greater upper-body strength than the press since the position on the bench is supported. The fact that bigger weights are done on the bench is good for upper body strength, but bad in that the limiting factor is the ability of the trunk to support the weight while it is lifted, and that doesn't get trained on the bench. So, it's a trade-off. All standard commercial gyms have several benches, so it's easy enough to do them, but be sure to use the press for at least half of your upper-body work.

The squat, press, deadlift, and bench press have been used for decades by the strongest athletes on the planet. There is good reason for that. Any program that doesn't use them is inferior to one that does, and any athlete who neglects them is doing less than what is possible in his performance, and less than what is absolutely necessary to maximize his strength.

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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 experience 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 books *Starting Strength: A Simple and Practical Guide for Coaching Beginners* and the forthcoming *Practical Programming for Strength Training*.