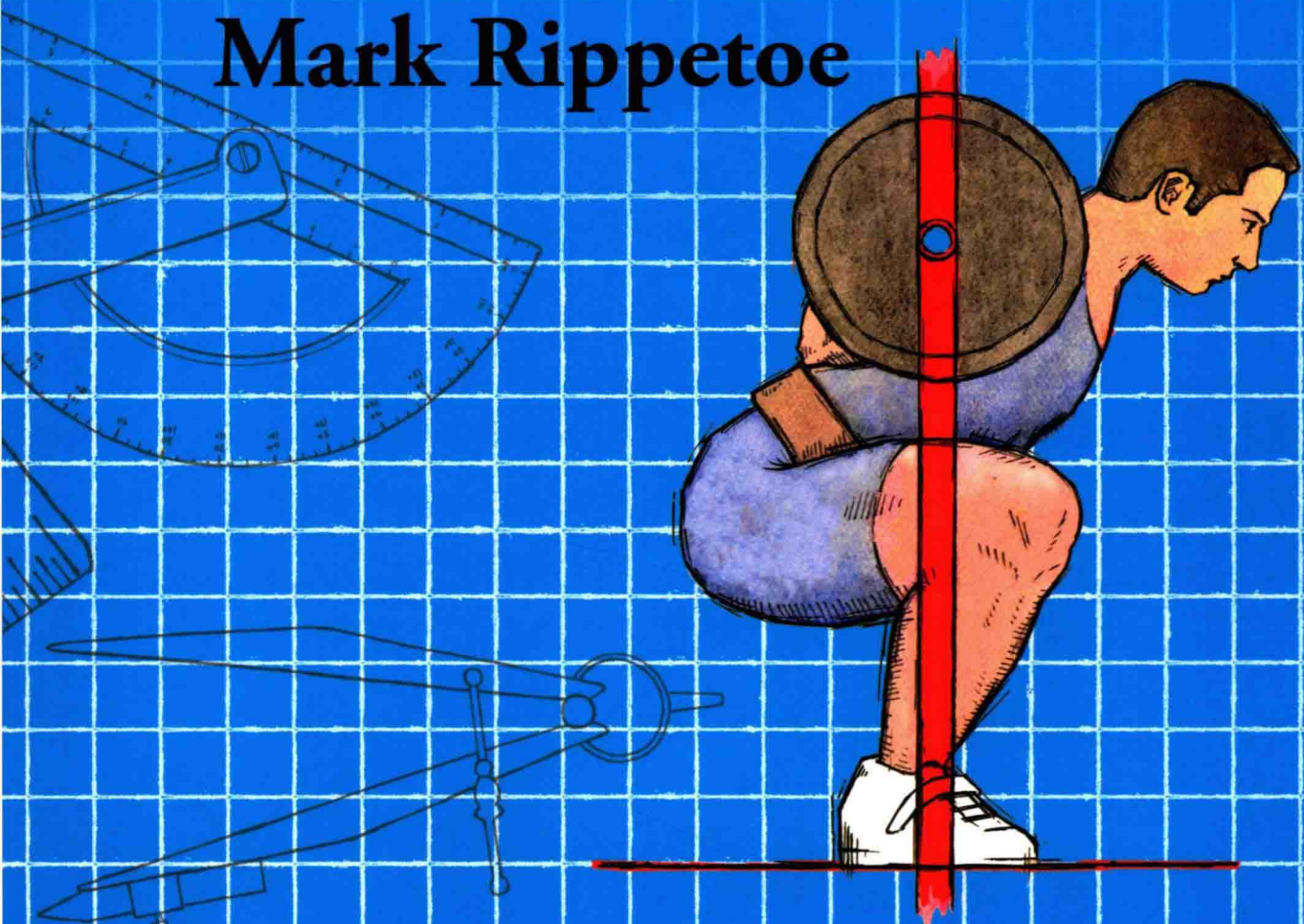


# Starting Strength

## Basic Barbell Training

3rd Edition

Mark Rippetoe



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The Aasgaard Company  
Wichita Falls, Texas

Second revision.

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3118 Buchanan St, Wichita Falls TX 76308, USA

[www.aasgaardco.com](http://www.aasgaardco.com)

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# **Starting Strength**



# Preface

Damned if things haven't changed in the four years since the 2nd edition of *Starting Strength* was written. The Aasgaard Company has changed personnel, I have met lots of people who have taught me many things, and we have had enormous success with what I thought was going to be a book ignored by the industry, academe, and the exercising public. I was right about the fitness industry and the folks with tenured positions, but I was wrong about you. Since 2007 we have taught several thousand people how to do these five lifts in our weekend seminars, and the 2nd edition has sold more than 80,000 copies, making it one of the best-selling books about weight training in publishing history. Thanks.

Now that we've learned some things from you guys – the ones we've been busy teaching for four years – the previous material in the 2nd edition is screaming for an update. Some of it is stale, incomplete, or just plain wrong, and it can't just lay there like a bureaucrat, badly needing something useful to do but making money anyway. This effort is not just the culmination of a top-to-bottom, year-long rewrite. It is the product of an intensive four-year testing program with many of you serving as the experimental population, one which has improved the teaching method for the five lifts, with an extra one thrown in.

It has also been a four-year school for me, as I have tried to find better ways to explain what I know to be true in terms that are understandable, logical, and, most importantly, correct. Much of this material is not in print anywhere else; hopefully, *that* doesn't make it wrong. But you're pretty bright, so you can decide for yourself.

The book needed a new look, too. Our hope is that you enjoy the illustrations by Jason Kelly, in a different style than usually found in a fat messy textbook, and that you appreciate Stef's Herculean efforts to make this a better-looking example of the bookmaker's art than the previous edition.

Many people deserve thanks for their contributions. In no particular order (certainly not alphabetical):

Dustin Laurence, Dr. Dennis Carter, Dr. Philip Colee, Dr. Matt Lorig, Stephen Hill, Juli Peterson, Mary Conover, Catherine Oliver, Bill Starr, Tommy Suggs, Mark Tucker, Thomas Campitelli, Ryan Huseman, Maj. Ryan Long, Maj. Damon Wells, Andrea Wells, John Welbourn, Brian Davis, Justin Ball, Nathan Davey, Travis Shepard, Paul and Becca Steinman, Mike and Donna Manning, Gregg Arsenuk, Michael Street and Carrie Klumpar, Skip and Jodi Miller, Ahmik Jones, Heidi Ziegele, Lynne Pitts, Kelly Moore, Eva Twardokens, Tara Muccilli, Dan Duane, Shane Hamman, Jim Wendler, Dan John, Jim Steel, Matt Reynolds, Charles Staley, Maj. Ryan Whittemore, John Sheaffer, Will Morris, Andy Baker, T.J. Cooper, Doug Lane, Simma Park, Myles Kantor, Phil Hammarberg, Barry Vinson, Gant Grimes, Josh Wells, Shelley Hancock, Terry Young, Ronnie Hamilton, Anil Koganti, MD, Rufus-dog, Ursa-dog, and Mr. Biggles.

—Rip



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# STRENGTH

## WHY AND HOW

Physical strength is the most important thing in life. This is true whether we want it to be or not. As humanity has developed throughout history, physical strength has become less critical to our daily existence, but no less important to our lives. Our strength, more than any other thing we possess, still determines the quality and the quantity of our time here in these bodies. Whereas previously our physical strength determined how much food we ate and how warm and dry we stayed, it now merely determines how well we function in these new surroundings we have crafted for ourselves as our culture has accumulated. But we are still animals – our physical existence is, in the final analysis, the only one that actually matters. A weak man is not as happy as that same man would be if he were strong. This reality is offensive to some people who would like the intellectual or spiritual to take precedence. It is instructive to see what happens to these very people as their squat strength goes up.

As the nature of our culture has changed, our relationship with physical activity has changed along with it. We previously were physically strong as a function of our continued existence in a simple physical world. We were adapted to this existence well, since we had no other choice. Those whose strength was adequate to the task of staying alive continued doing so. This shaped our basic physiology, and that of all our vertebrate associates on the bushy little tree of life. It remains with us today. The relatively recent innovation known as the Division of Labor is not so remote that our genetic composition has had time to adapt again. Since

most of us now have been freed from the necessity of personally obtaining our subsistence, physical activity is regarded as optional. Indeed it is, from the standpoint of immediate necessity, but the reality of millions of years of adaptation to a ruggedly physical existence will not just go away because desks were invented.

Like it or not, we remain the possessors of potentially strong muscle, bone, sinew, and nerve, and these hard-won commodities demand our attention. They were too long in the making to just be ignored, and we do so at our peril. They are the very components of our existence, the quality of which now depends on our conscious, directed effort at giving them the stimulus they need to stay in the condition that is normal to them. Exercise is that stimulus.

Over and above any considerations of performance for sports, exercise is the stimulus that returns our bodies to the conditions for which they were designed. Humans are not physically normal in the absence of hard physical effort. Exercise is not a thing we do to fix a problem – it is a thing we must do anyway, a thing without which there will always *be* problems. Exercise is the thing we must do to replicate the conditions under which our physiology was – and still is – adapted, the conditions under which we are physically normal. In other words, exercise is substitute cave-man activity, the thing we need to make our bodies, and in fact our minds, normal in the 21st century. And merely normal, for most worthwhile humans, is not good enough.

An athlete's decision to begin a strength training program may be motivated by a desire to join a team sport that requires it, or it might be for more personal reasons. Many individuals feel that their strength is inadequate, or could be improved beyond what it is, without the carrot of team membership. It is for those people who find themselves in this position that this book is intended.

## Why Barbells?

Training for strength is as old as civilization itself. The Greek tale of Milo serves to date the antiquity of an interest in physical development, and an understanding of the processes by which it is acquired. Milo is said to have lifted a calf every day, and grew stronger as the calf grew larger. The progressive nature of strength development was known thousands of years ago, but only recently (in terms of the scope of history) has the problem of how best to facilitate progressive resistance training been tackled by technology.

Among the first tools developed to practice resistance exercise was the barbell, a long metal shaft with some type of weight on each end. The earliest barbells used globes or spheres for weight, which could be adjusted for balance and load by filling them with sand or shot. David Willoughby's superb book, *The Super Athletes* (A.S. Barnes and Co., 1970) details the history of weightlifting and the equipment that made it possible.

But in a development unforeseen by Mr. Willoughby, things changed rapidly in the mid-1970s. A gentleman named Arthur Jones invented a type of exercise equipment that revolutionized resistance exercise. Unfortunately, not all revolutions are universally productive. Nautilus utilized the "principle of variable resistance," which claimed to take advantage of the fact that different parts of the range of motion of each limb were stronger than others. A machine was designed for each limb or body part, and a cam was incorporated into the chain attached to the weight stack that varied the resistance against the joint during the movement. The machines were designed to be

used in a specific order, one after another without a pause between sets, since different body parts were being worked consecutively. And the central idea (from a commercial standpoint) was that if enough machines – each working a separate body part – were added together in a circuit, the entire body was being trained. The machines were exceptionally well-made and handsome, and soon most gyms had the obligatory, very expensive, 12-station Nautilus circuit.

Exercise machines were nothing new. Most high schools had a Universal Gladiator multi-station unit, and leg extensions and lat pulldowns were familiar to everybody who trained with weights. The difference was the marketing behind the new equipment. Nautilus touted the total-body effect of the complete circuit, something that had never before been emphasized. We were treated to a series of before-and-after ads featuring one Casey Viator, an individual who had apparently gained a considerable amount of weight using only Nautilus equipment. Missing from the ads was the information that Mr. Viator was regaining size he previously had acquired through more conventional methods as an experienced bodybuilder.

Jones even went so far as to claim that strength could be gained on Nautilus and transferred to complicated movement patterns like the Olympic lifts without having to do the lifts with heavy weights, a thing which flies in the face of exercise theory and practical experience. But the momentum had been established and Nautilus became a huge commercial success. Equipment like it remains the modern standard in commercial exercise facilities all over the world.

The primary reason for this was that Nautilus equipment allowed the health club (at the time known as the "health spa") industry to offer to the general public a thing which had been previously unavailable. Prior to the invention of Nautilus, if a member wanted to train hard, in a more elaborate way than Universal equipment permitted, he had to learn how to use barbells. Someone had to teach him this. Moreover, someone had to teach the health spa staff how to teach him this. Such professional education was, and still is, time-consuming and

not widely available. But with Nautilus equipment, a minimum-wage employee could be taught very quickly how to use the whole circuit, ostensibly providing a total-body workout with little invested in employee education. Furthermore, the entire circuit could be performed in about 30 minutes, thus decreasing member time on the exercise floor, increasing traffic capacity in the club, and maximizing sales exposure to more traffic. Nautilus equipment quite literally made the existence of the modern health club possible.

The problem, of course, is that machine-based training did not work as it was advertised. It was almost impossible to gain muscular bodyweight doing a circuit. People who were trying to do so would train faithfully for months without gaining any significant muscular weight at all. When they switched to barbell training, a miraculous thing would happen: they would immediately gain – within a week – more weight than they had gained in the entire time they had fought with the 12-station circuit.

The reason that isolated body part training on machines doesn't work is the same reason that barbells work so well, better than any other tools we can use to gain strength. The human body functions as a complete system – it works that way, and it likes to be trained that way. It doesn't like to be separated into its constituent components and then have those components exercised separately, since the strength obtained from training will not be utilized in this way. The general pattern of strength acquisition must be the same as that in which the strength will be used. The nervous system controls the muscles, and the relationship between them is referred to as "neuromuscular." When strength is acquired in ways that do not correspond to the patterns in which it is intended to actually be used, the neuromuscular aspects of training have not been considered. Neuromuscular specificity is an unfortunate reality, and exercise programs must respect this principle the same way they respect the Law of Gravity.

Barbells, and the primary exercises we use them to do, are far superior to any other training tools that have ever been devised. **Properly performed, full-range-of-motion barbell exercises**

**are essentially the functional expression of human skeletal and muscular anatomy under a load.**

The exercise is controlled by and the result of each trainee's particular movement patterns, minutely fine-tuned by each individual limb length, muscular attachment position, strength level, flexibility, and neuromuscular efficiency. Balance between all the muscles involved in a movement is inherent in the exercise, since all the muscles involved contribute their anatomically determined share of the work. Muscles move the joints between the bones which transfer force to the load, and the way this is done is a function of the design of the system – when that system is used in the manner of its design, it functions optimally, and training should follow this design. Barbells allow weight to be moved in exactly the way the body is designed to move it, since every aspect of the movement is determined by the body.

Machines, on the other hand, force the body to move the weight according to the design of the machine. This places some rather serious limitations on the ability of the exercise to meet the specific needs of the athlete. For instance, there is no way for a human being to utilize the quadriceps muscles in isolation from the hamstrings in any movement pattern that exists independently of a machine *designed* for this purpose. No natural movement can be performed that does this. Quadriceps and hamstrings *always* function together, at the same time, to balance the forces on either side of the knee. Since they *always* work together, why should they be *exercised* separately? Because somebody invented a machine that lets us?

Even machines that allow multiple joints to be worked at the same time are less than optimal, since the pattern of the movement through space is determined by the machine, not the individual biomechanics of the human using it. Barbells permit the minute adjustments during the movement that allow individual anthropometry to be expressed.

Furthermore, barbells require the individual to make these adjustments, and any other ones that might be necessary to retain control over the movement of the weight. This aspect of exercise cannot be overstated – the control of the bar, and the balance and coordination demanded of the trainee,

are unique to barbell exercise and completely absent in machine-based training. Since every aspect of the movement of the load is controlled by the trainee, every aspect of that movement is being trained.

There are other benefits as well. All of the exercises described in this book involve varying degrees of skeletal loading. After all, the bones are what ultimately support the weight on the bar. Bone is living, stress-responsive tissue, just like muscle, ligament, tendon, skin, nerve, and brain. It adapts to stress just like any other tissue, and becomes denser and harder in response to heavier weight. This aspect of barbell training is very important to older trainees and women, whose bone density is a major factor in continued health.

And barbells are very economical to use. In practical terms, five or six very functional weight rooms – in which can be done literally hundreds of different exercises – can be built for the cost of one circuit of any brand of modern exercise machine. Even if cost is not a factor, utility should be. In

an institutional situation, the number of people training at a given time per dollar spent equipping them might be an important consideration in deciding which type of equipment to buy. The correct decision about this may directly affect the quality of your training experience.

The only problem with barbell training is the fact that the vast, overwhelming majority of people don't know how to do it correctly. This is sufficiently serious and legitimate a concern as to justifiably discourage many people from training with barbells in the absence of a way to learn how. This book is my humble attempt to address this problem. This method of teaching the barbell exercises has been developed over 30 years in the commercial fitness industry, the tiny little part of it that remains in the hands of individuals committed to results, honesty about what works, and the time-honored principles of biological science. I hope it works as well for you as it has for me.

This York Barbell model 38 Olympic Barbell set was obtained from the Wichita Falls Downtown YMCA. It was used for nearly 50 years by thousands of men and women. Among them was Bill Starr, famous strength coach, Olympic weightlifter, and one of the first competitors in the new sport of Powerlifting. Bill was the editor of Hoffman's "Strength and Health" magazine and Joe Weider's "Muscle" magazine. He was he coach of numerous national, international, and Olympic teams as well as one of the very first full-time strength coaches at the collegiate and professional level. He is one of the most prolific writers in the Iron Game, with books and articles published over 5 decades. His influence is still felt today through the accomplishments of his many athletes and training partners. His first weightlifting was done on this set.

From the Bill Starr Monument in Wichita Falls Athletic Club, Wichita Falls, Texas.





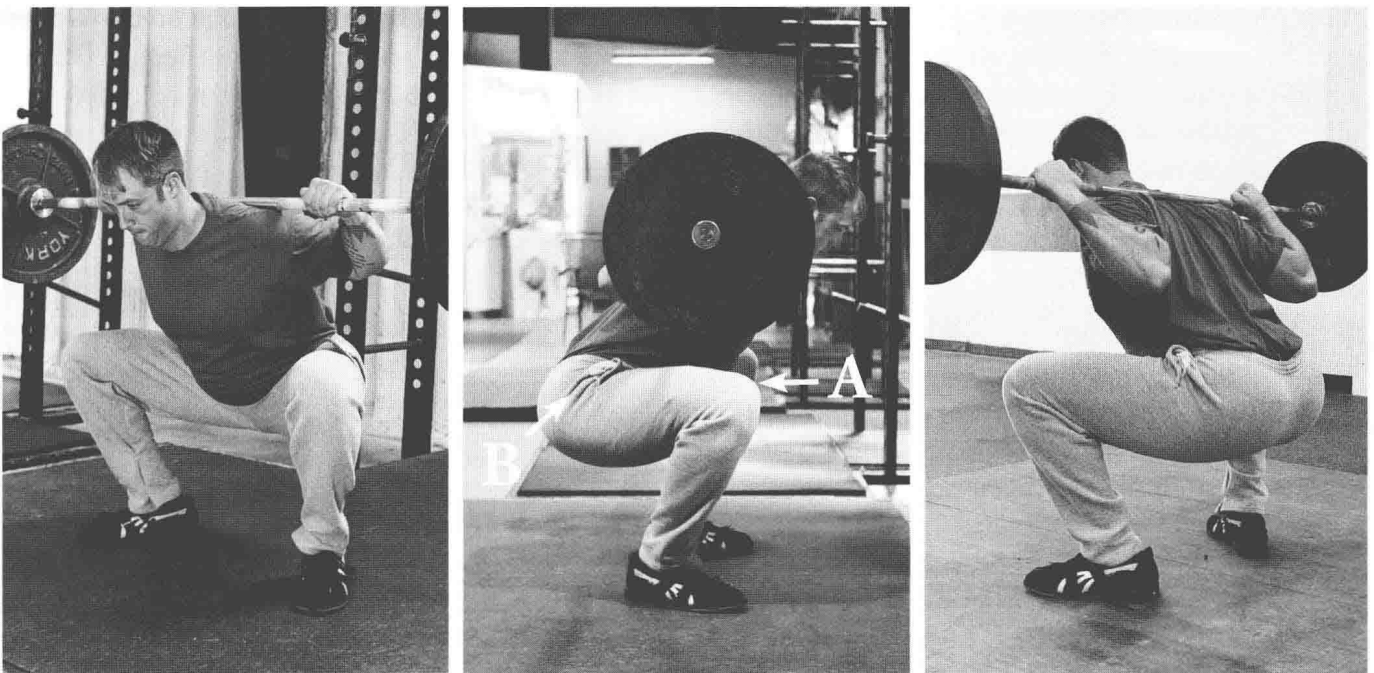


# THE SQUAT

The squat has been the most important, yet most poorly understood, exercise in the training arsenal for a very long time. The full-range-of-motion exercise known as the squat is the single most useful exercise in the weight room, and our most valuable tool for building strength, power, and size.

The squat is literally the only exercise in the entire repertoire of weighted human movement that allows the direct training of the complex movement pattern known as *hip drive* – the active recruitment

of the muscles of the posterior chain. The term *posterior chain* refers to the muscles that produce hip extension – the straightening out of the hip joint from its flexed (or bent) position in the bottom of the squat. These muscle groups – also referred to as the *hip extensors* – are the hamstrings, the glutes, and the adductors (groin muscles). Because these important muscles contribute to jumping, pulling, pushing, and anything else involving the lower body, we want them strong. The best way to get them strong is to squat, and if you are to squat correctly, you must use



**Figure 2-1.** Three views of the squat. *Middle*, Depth landmarks for the full squat. The top of the patella (A) and the hip joint, as identified by the apex in the crease of the shorts (B). The B side of the plane formed by these two points must drop below parallel with the ground.



hip drive, which is best thought of as a shoving-up of the sacral area of the lower back, the area right above your butt. Every time you use this motion to propel yourself out of the bottom of the squat, you train the muscles in the posterior chain.

All styles of squatting tend to make the quads sore, more so than any of the other muscles in the movement. This soreness occurs because the quads are the only knee extensor group, while the hip extensors consist of three muscle groups (hamstrings, glutes, adductors). They comprise more potential muscle mass to spread the work across – if they are trained correctly. Given this anatomical situation, we want to squat in a way that maximizes the use of all the muscle that can potentially be brought into the exercise and thus be strengthened by it. So we need a way to squat that involves the posterior muscle mass, making it operate up to its potential for contributing to strength and power. The “low-bar” back squat is that way.

Done correctly, the squat is the only exercise in the weight room that trains the recruitment of the entire posterior chain in a way that is progressively improvable. These are the things that make the squat the best exercise you can do with barbells and, by extension, the best strength exercise there is. The squat trains the posterior chain muscles more effectively than any other movement that uses them because none of the other movements involve enough range of motion to use them all at the same time, and none of the other movements train this long range of motion by preceding their *concentric*, or shortening, contraction with an *eccentric*, or lengthening, contraction, which produces a stretch-shortening cycle, or *stretch reflex*.

The squat’s stretch-shortening cycle is important for three reasons:

1. The stretch reflex stores energy in the viscoelastic components of the muscles and fascia, and this energy gets used at the turnaround out of the bottom.
2. The stretch tells the neuromuscular system that a contraction is about to follow. This

signal results in more contractile units firing more efficiently, enabling you to generate more force than would be possible without the stretch reflex.

3. Because this particular loaded stretch is provided by the lowering phase of the squat (which uses all of the muscles of the posterior chain over their full range of motion), the subsequent contraction recruits many more motor units than would be recruited in a different exercise.

The conventional deadlift, for example, uses the hamstrings and glutes, but it leaves out much of the adductors’ function, and starts with a concentric contraction in which the hips start out well above the level of a deep squat. No bounce, shorter range of motion, but very hard anyway – harder, in fact, than squatting, due to the comparatively inefficient nature of the dead-stop start – yet not as useful to overall strength development. Plyometric jumps can be deep enough and might employ the requisite stretch reflex provided by the drop, but they are not incrementally increasable the way a loaded barbell exercise is, they can be damned tough on the feet and knees for novices, and they are not weight-bearing in the sense that the whole skeleton is loaded with a bar on the shoulders. In contrast, the squat uses all the posterior chain muscles, uses the full range of motion of the hips and knees, has the stretch-shortening cycle inherent in the movement, and can be performed by anybody who can sit down in a chair, because we have very light bars that can be increased in weight by very small increments.

The term “posterior chain” obviously refers to the anatomical position of these muscular components. It also indicates the nature of the problems most people experience under the bar, trying to improve their efficiency while squatting. Humans are bipedal creatures with prehensile hands and opposable thumbs, a configuration that has profoundly affected our perception as well as our posture. We are used to doing things with our hands in a position where our eyes can see them, and we are therefore set up to think about things done with