Starting Strength

Training and Performance for the Novice Athlete

by

Nicholas Soleyn

I have been fortunate enough to teach a wide range of people how to train for strength – men and women, from de-trained sexagenarians to over-puffed young athletes – most of whom previously had never considered barbell training as a means toward reaching their physical goals. For almost all trainees, I find that the reasons they start training and the reasons they continue to train after some initial success are different, and involve a change in their mindset and their approaches to training. Across the board, sometime after their first really good set of heavy squats or the first time they grind out a press or when they pull significantly more than their bodyweight off the floor, they experience a shift in perspective in which they begin to approach training with what I think of as an athlete's mindset.

Though they may or may not be athletes in the practical, competitive sense, this is a mentality I see more readily in older trainees than in young people, and often has little to do with the individual's desire to participate in a sport. The sixty year old who is motivated by progress changes her lifestyle to accommodate and maximize her training so that she can get strong, remain capable, and be physically self-reliant two decades from now, has an athlete's approach to training. In contrast, the young high school sports participant who mistakes the blessings of youth for athletic ability or the results of training has yet to gain this perspective at a time when, if he wants to pursue an athletic career of any duration, it would be to his greatest benefit.

An individual's mentality and approach to training is as defining a characteristic of an athlete as the fact of competing in sports. After all, for the novice who wants to become an athlete, the only real difference between sports performance and just exercising is in the individual's preparation and perspective. This article discusses important distinctions between training, practice, and performance, and will, hopefully, provide some valuable perspective on how to approach training for performance for the young or novice athlete.

Training, Exercise, and Performance

> The elegance of a skilled movement reflects the contributions of heredity and the adaptations of training. Specific structural and functional attributes of skeletal muscles are inherited. This genetic inheritance sets unknown limits—a performance envelope, if you will—within which attributes of

> skeletal muscle fibers are able to adapt to habitual patterns of use and disuse. Physical training, then, is a means by which individuals can push to the limits of their own individual performance envelope and express their potential for a given physical activity. (Brooks, Fahey, and Baldwin, "Exercise Physiology: Human Bioenergetics and Its Applications," pp. 430-31 (4th ed. 2005)).

As distinguished from training, exercise and performance share the same focus: How good, fast, or strong are you today? Exercise is often a loosely structured series or continuum of workouts that tend toward exhaustive repetition or random variety where the participant's goal exists within the execution of the workout itself. Physical changes ("results") are the byproducts of the workouts, not the goal, and are mostly hoped for rather than planned. Given that just about any new, rigorous, and repeated physical activity will yield some positive physical changes, exercisers often confuse their series of workouts with training and their measure of results with efficacy.

The main differences between exercise and performance are perspective and scale. Performance is a comparative, hopefully objective, expression of one's capabilities within a particular series, on a particular day, during a game or match, or in a single moment. The goal of any athlete is the best possible expression of physical capacity in this snapshot of time. One may view both exercise and performance as singular events in which the goal is how well one executes the specified physical activity in the moment. This is often the perspective of young, wannabe athletes who live game-to-game hoping for the best outcome. For the athlete, however, performance must take on a greater significance. Rather than a singular event, performance is the culmination of training; the full expression of the individual's physical capacity, built over time, leading up to the event.

In the same way that exercise and training are two distinct subsets of physical activity, training is not performance and performance is not training, and they should not mimic one another. Training comprises planned biological adaptations that, when achieved, move one closer to a specific goal. This definition of training may be easily distinguished from performance: The goal of every training session is what happens as a result of the physical activity engaged in during training, whereas performance is a snapshot expression of one's physical capability to execute a task. For the athlete, performance represents the culmination of specifically induced physical changes up to the time of competition, executed with a level of proficiency facilitated through inherited ability and the learned adeptness that comes from practice. Performance is task-oriented: one's competence to complete a given task or tasks is measure of performance. In contrast, the completion of training tasks is not measured other than to induce and quantify the intended adaptation.

The athlete can plan to get better and train for improvement, but he must not approach training from a "performance perspective." Training builds the athlete's general physical ability to execute tasks, whereas performance only measures the efficiency or skill with which that general capacity is executed when performing a specific task. Training should be organized from general to specific when considering the types of adaptations sought, building the athlete's potential in the broadest, most widely applicable ways, laying the best foundation for performance, and it should be clearly distinguished from practice.

Practice is Not Training

> Purposeful human movement is the defining characteristic in arts, sports, occupational and domestic tasks, and recreational activities.…The physical activity patterns of a given individual arise principally from the properties of skeletal muscle fibers, the joints through which fibers act, and the coordination and integration of recruitment patterns of motor units in the involved musculature. (Id. at 363).

Practice is an absolute necessity for sports performance. Sports take the broad phenotypic expressions of human biodynamics (the general range of dynamic interaction between humans and their environment) and essentially narrow them to artificial, controlled environments with specific rules. Practice is where one acquires or improves skills that allow the specific expression of one's physical capacity within the rules or conventions of the performance. If all one needed to do to meet one's maximum potential at a given task was to refine the details of its narrow expression, then training would mimic performance of the task. It would be practice.

However, it is the athlete's general physical capacity to interact with the environment that will limit or define the best expression of his performance-oriented physical activity. The basic development of the human body's physical capacity for purposeful movement forms the foundation of the human phenotype, not just its narrow expressions observed in performance environments. Practice hones the expressions of human movement specific to a sport. However, one can only develop these expressions to the limitations of the individual's general physical capacity (his or her physical potential). One's genetic endowment and the level to which the athlete has trained his general physical abilities set these limitations. Training must be distinguished from practice by its foundation in the basics of human movement and biological adaptation, and its ability to develop the capacity for the highest levels of performance of which the athlete is capable.

This analysis should provide a different lens through which athletes and coaches view training, as separate from the need to practice performance-based skills or movements. For example, every athlete must train the ability of the skeletal muscles to control the body and exert force against external objects, because this ability, called strength, is the foundation of purposeful movement. It should be obvious that when one trains this general adaptation, training should be organized around improving strength, and not around a specific movement. ***Strength is the basis of movement, and there is no such thing as movement-specific strength.*** The strong athlete hones the expressions of strength required for performance through practice.

Still, silly and unfortunate training practices that attempt to train movements instead of general physical capacity abound: quarter-squats are rationalized because they mimic particular movement patterns in sports, such as running, jumping, and cycling; the need for explosiveness has been used to explain away the "slow lifts" for under-strong athletes; metabolic conditioning in training has become the Gold Standard for time spent in the gym and a measure of one's fitness to compete, regardless of the task of competition. Misinformed strength training revolves around specific movements derived from sport performance instead of the biological adaptations necessary to elevate the athlete's maximum potential through improvements in general physical capacity. When training mimics performance, the bleeding of performance standards into training programs will ignore some basic concepts that should influence how the athlete trains.

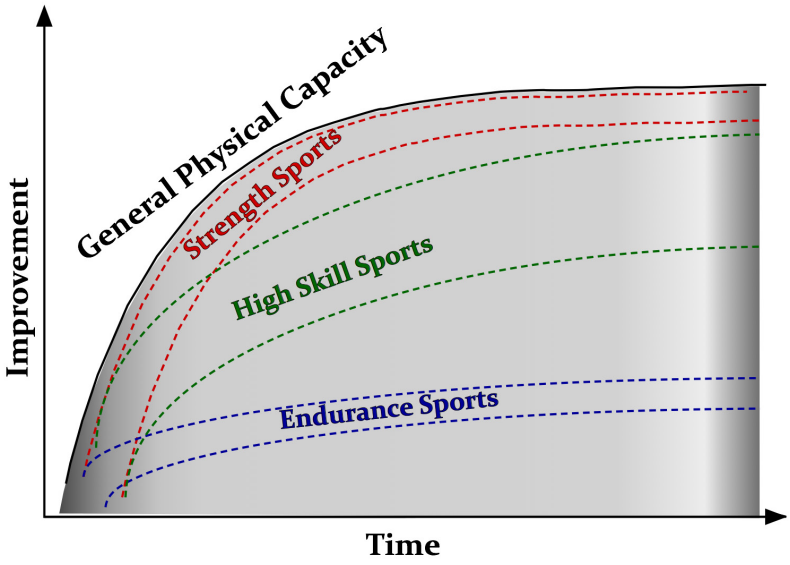
The most basic principles for organizing training are the Stress-Recovery-Adaptation cycle and the principle of specificity of adaptation. When exposed to sufficient stress, the human body will respond by adapting to continued exposure to that stress. Stress may be active, such as from shock or injury or the stress of lifting weights, or stress may result from passive inactivity, such as long-term bed rest. Either way, stress sufficient to cause adaptation requires a significant change from what the body is used to. When the stress is active, the body engages in certain recovery processes that lead to adaptation to the stress by getting stronger, called supercompensation. Importantly, stress, recovery, and adaptation occur on a cellular level.

Accordingly, the specific manner in which the body adapts must be viewed at the most basic levels. Regarding strength, the process of stress, recovery, and adaptation alters the gene expression

of skeletal muscles allowing for greater force production. A successful cycle of stress, recovery, and adaptation results in an increase in the amount of specific muscle proteins. Thus, training for strength takes advantage of *myoplasticity* – the inherent ability of skeletal muscle to adapt and change.

Unfortunately, the concept that the body adapts with specificity to a specific stress is often viewed through a movement-specific lens. For example, if the athlete needs to jump higher, then a coach may prescribe quarter-squats, since the angles produced in the quarter-squat look like the angles that the athlete produces when he jumps. The idea is that the athlete will get "stronger at jumping." Again, this is a backwards view of training organization; if the athlete's jumping ability is limited by strength, then the training should focus around strength, not jumping. In which case, the goal would be *to induce a stress that would best strengthen all the muscles used in the jump.* The most efficient exercise will be the one that makes the athlete stronger, which will in turn improve his jump. In this example, the full, correctly performed squat is the most effective, most efficient training exercise for improving the under-strong athlete's jumping ability. (*See* Hartman H, Wirth K, Klusemann M, et al., "Influence of squatting depth on jumping performance, "Journal of Strength and Conditioning Research (2012) 26(12):3243-3261; see also Jonathan Sullivan, "The Year in Strength Science 2012," P. 9-10 (discussing the Hartman paper)).

Training is general, but performance requirements help set training goals by helping the coach and athlete assign value to the biological adaptations that raise the athlete's general physical capacity. An underweight, under-strong athlete in a contact sport needs to place more value on acquiring strength than an endurance athlete. Similarly, strength will always be at the forefront of training for athletes in strength sports, whereas runners may be deemed strong enough much earlier in their athletic careers. Regardless of the sport, raising the general capacity of the athlete is always beneficial, because it will increase the athlete's potential. Training only varies because, as the athlete gets stronger, every measurable improvement in general capacity costs more training time and becomes less valuable (by degrees, depending on the sport) relative to the demands of sport performance. While it is important to know when the athlete has become strong enough, it is equally important to understand that, all else being equal, an athlete can



One possible graphical representation of the relationship between improvements in sports performance and one's general physical capacity. All performance, regardless of sport, exists in the shaded area, somewhere less than the athlete's best possible performance in any given moment. The dotted lines are simplified correlations between improvements in one's general capacity and the benefit to sport performance. Strength sports will benefit from general strength improvement at nearer a one-to-one ratio than high-skill or pure endurance sports. Whereas, the benefit of general capacity improvements will taper very quickly in endurance sports, where improving performance depends more on specific metabolic conditioning and efficiency.

never be too strong. This understanding is perhaps most important in training young, novice athletes for whom each measurable improvement in strength costs very little but has a large impact on their general physical capacity.

Organizing Training: From Novice to Athlete

Viewing training as the process of biological adaptation that raises the athlete's general capacity, or potential, to perform should influence how the athlete approaches training and decides to allocate the time he has available to improving his sports performance. Training starts from where the athlete is today and programs predictable, measurable improvements from there. It is a constant progression of improvement over time. Therefore, training should not be organized around the athlete's performance weaknesses, as exposed in a snapshot view of practice or competition, but rather should be determined based on the greatest benefit to the athlete for the time spent training.

Training should take the long view. A person is only an athlete if he plans on having an athletic career that spans some amount of time. Otherwise, the person is only a participant in the sporting event. The "career" may span only a season or series of events, it may comprise the athlete's high school, college, or post-collegiate career, or it may be a single scheduled event that the athlete trains for over some period of time. No matter the duration, the athlete's approach to training encompasses more than a single instance of physical activity. This allows the athlete an opportunity to change his current physical capacity over time. Change and improvement over time is the ultimate goal of training.

By improving general physical capacity, training should address weaknesses in performance, but the correction of specific performance inadequacies should not be the organizing principle of one's training program. Sometimes called "rate-limiting factors," you can think of performance components like the steps in an assembly line:

> Imagine an assembly line that manufactures a commodity such as an automobile. Although there are many steps in the manufacturing process, assume that one step – installing the engine – is the slowest. If we want to increase production, it will do us little good to increase the speed of the other steps, such as assembling the chassis. Rather, we should focus our attention on speeding up the process of installing the engine. (Brooks *supra* at 5).

A coach must analyze the athlete's rate-limiting performance factors to determine whether the weakness is related to the athlete's general capacity to perform, or to specific expressions of that capacity determined by the skills necessary for execution of the performance tasks. In the assembly line analogy, speeding up the process of installing the engine may improve the efficiency of the current capacity of the entire assembly line. In the same way, addressing rate-limiting factors of performance through practice is like improving the athlete's efficiency in executing specific performance tasks. However, production output (performance) may also be improved by increasing general capacity. For the assembly line, this would perhaps be analogous to hiring more workers. If the assembly line was understaffed to begin with, then each additional worker will speed up the entire process, including the engine installation. Once the general capacity has been improved, if we then focus on improving the specific task of engine installation, the end result is a higher level of production across the board than if we had only improved the engine installation process.

The novice athlete is like the understaffed assembly line. He will gain more improvement across the board by training his general physical capacity until he is no longer underdeveloped. Rate-limiting factors – performance weaknesses – are inefficient areas of specific execution that limit performance.

The level of performance that might be gleaned through improving the athlete's "efficiency" is, in turn, limited by the athlete's general physical capacity. One's general capacity, however, is the level of performance of which the athlete is capable. Training is the process that addresses general physical capacity.

The athlete with the greatest *general* capacity can outperform the athlete with lower general capacity and high specific execution ability, and do so with minimal effort. Stated another way, assuming the same skill level, the more developed athlete will perform at a higher level. Or yet again, for the individual athlete, improving his general capacity through training will always yield performance improvements and will make specific sports-determined physical expressions more valuable. *The athlete who neglects training, focusing on rate-limiting factors, such as technique and metabolic specificity, limits himself unnecessarily.* In the long run, the athlete with greater general capacity has set himself up for higher levels of performance, while the athlete who only wants to practice looks good until his progress grinds to a halt for a lack of general physical adaptation, primarily strength.

From a performance-based perspective, on any given day, an argument can always be made for practicing skills and improving technique. Performance is a snapshot in time of one's general capacity as expressed to the greatest extent possible given specific factors such as technique, metabolic conditioning, and various environmental factors. Because flaws in performance are readily observed it is easier to blame poor skill development or execution flaws rather than an insufficient general capacity to execute the skill. The coach must consider the athlete's level of training advancement and ability to improve general capacity through training – making the athlete stronger rather than a single-minded focus on practicing technique. This is especially important in young, novice trainees.

Strength in Sport

Strength is fundamental to all training because it provides a greater benefit per incremental increase than any other specific adaptation. For the rank novice, a significant measurable improvement in strength is more valuable than a similar improvement in technique or metabolic specificity. This should provide a starting place for organizing training for performance.

A training program depends on and works toward a specified goal, contains certain physical activities (the exercises), and organizes the activities to elicit specific adaptations that progress the trainee toward the goal. If a program does not meet these basic criteria, the athlete is not training.

An effective program, however, must go further: exercises, their organization, and the resulting adaptations should provide the most efficient progression toward the goal possible. A program's effectiveness depends on how close it comes to producing the maximum progress the individual trainee is capable of achieving. Accordingly, an effective training program should consider the way the body responds to physical activity as its basic organizing principle, with planned improvements along the way to mark and measure progress.

So, what does this mean for training for performance? In short, an athlete should spend as much time as necessary raising his general capacity to perform until the next increment of improvement costs time that could better be spent developing more specific adaptations. Strength is the most basic general adaptation for improving fitness and performance and should therefore be the starting place for novices. (*See* Michael Wolf, "Strength & Barbells: The Foundations of Fitness," Starting Strength Articles (October, 2012)). For the underweight, under-strong athlete, as defined by his level of training advancement and the demands of his sport, an increase in general capacity will always yield the greatest

long-term benefit per unit of training time. External activities, habits, and practices that limit recovery merely raise the cost of the improvement.

This concept helps focus training priorities, where our basic understanding of stress-adaptation-recovery quantifies the cost of each incremental increase. An athlete who can complete a stress-recovery-adaptation cycle from one workout to the next can easily maximize the benefits of training by getting stronger from workout to workout. Because an incremental improvement in strength is more beneficial than incremental improvements in more specific adaptations, there is no reason for the rank novice to devote training time to anything but improving strength. At minimum, strength training should take precedence over practice until the trainee is out of the novice phase, meaning he can no longer get stronger from workout to workout.

At some point, an incremental improvement in strength takes a relatively long time, with increasingly complex programming. During training for this incremental improvement, it would be foolish to ignore the opportunity for improving the efficiency of execution through less-general physical adaptations and a focus on the specific tasks of the sport. Beyond the novice phase, the demands of the sport determine the relative costs of training for strength and general physical capacity and the practice of performance-specific skills. But the coach and athlete must always be conscious of the value of improving strength and the athlete's general physical capacity as an investment toward long-term success. Strength always benefits performance.

Nicholas Soleyn, J.D., owns a small publishing company in Albuquerque, New Mexico. Through his study of the law, work as an editor for a legal journal, and work as a law clerk for the New Mexico Supreme Court, he discovered a passion for research and writing, which he now pursues full time. His has also trained in and coached amateur boxing, martial arts, and endurance sports. As Starting Strength Coach, Nick brings his analytical approach to strength training, and he is privileged to help people discover their athletic potential through the barbell.

Starting Strength : Resources : Articles : Forums : Discuss This Article