

Science and Practice of Coaching a Strength Training Program for Novice and Intermediate-Level Athletes

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A CURSORY GLANCE AT THE pages of past issues of *Strength and Conditioning Journal* reveals many articles concerned with the design or effect of various strength and conditioning programs, but a relative paucity of articles concerned with the teaching and on-going coaching of the skill of strength training exercises. This is surprising considering that teaching and coaching of new exercise skills can constitute the vast majority of a strength coaches time when dealing with high school and younger college-aged athletes. This article will address some of these aspects of the coaching process, including teaching and coaching exercises to novice and intermediate-level athletes (typical of high school and younger college-aged athletes), technical analysis and modification, motivation, goal setting, reinforcement, and the overall interaction between these concepts.

Strength training coaches concern themselves with methods that ensure persistent and consistent behaviors in athletes that lead

to improved technique, strength, and motivation. Aside from designing the appropriate program, the coach must teach and then reinforce good technique. Perfect technique in every repetition of every set of every exercise is impossible, but it should be the goal of the strength coach to aspire to develop this behavior. Consequently, the strength coach of novice and intermediate-level athletes must be concerned with technique teaching and analysis, behavior (technique) modification, motivation, goal setting, and reinforcement. This effort ensures persistently good technique, strength, and motivation in the athlete.

■ Coaching the Skills of Strength Training Exercises

Strength training exercises are skills much the same as any sport skill. However, different stages of learning have been identified (2, 5). This means that the methods of teaching to novice and intermediate-level athletes are somewhat different. People learn skills in a certain way and should be taught

strength exercises the same way as they would be taught other sports skills (2, 5). According to motor learning theory, there are 3 stages of learning a sport skill: the novice stage (cognitive phase), the intermediate-level-1 stage (associative phase), and the intermediate-level-2 stage (autonomous phase) (2, 5). These stages relate to how the skill is being formed in the neural system (gradually becoming a motor schema). Therefore, these stages require 3 slightly different approaches of teaching and coaching.

The length of these stages of learning is individual and can range from a few sessions (or even sets) to a number of weeks. For example, an athlete may be an overall novice strength training athlete with only 3 sessions of weight training experience but may have already progressed to be in intermediate-level-1 stage of learning. By the end of 6 to 8 weeks of training, an athlete should be in intermediate-level-2 stage of learning of the basic exercises. However, if a new exercise is introduced, then

Table 1
Stages of Learning and Teaching for Novices in Strength Training

Teaching a New Strength Training Exercise to a Beginner

1. Name the exercise.
2. Demonstrate the exercise.
3. Identify 2 to 3 key aspects of technique that largely account for success in the lift.
4. Demonstrate the exercise again, concentrating on those 2 to 3 key aspects of technique.
5. Athlete practices the exercise, concentrating on those 2 to 3 key aspects with only limited feedback from the coach.

Ongoing Coaching of a Strength Training Exercise With a Beginner

1. Coach prepares athlete by getting them to focus on 2 or 3 key aspects.
2. Athlete performs the set.
3. After the set, the coach provides simple, positive praise related to the basic outcome and the outcome of the key aspects.

■ **Coaching and the Beginning Stage of Learning**

The coaching of most sport skills is similar. For teaching a new exercise or skill, the Australian Coaching Council (2) recommends there should be 5 distinct parts to the coaching process (Table 1). First, name the exercise, and second, demonstrate it 2 or 3 times. Third, identify 2 or 3 key aspects of performance for the athlete to focus on. Follow this by demonstrating the exercise again, illustrating the key points that were previously mentioned. The athlete will be attempting to imprint the coach's performance of these key points into their own neural network. Finally, allow the athlete to practice the skill by performing a set or a number of sets at a very slow speed with either no weight, an empty barbell, or a dowel rod. Gradually increase the speed of the performance to that which you feel is appropriate (still slow for novices). In this initial stage of learning, the novice athlete attempts to learn by imprinting the performance of the coach on their own neural network and then by attempting to reproduce it physically. Thus, it has been suggested that the novice learner must form an idea of the skill, and therefore, the task is more cognitive than motor at this stage (5)

At this stage, the athlete merely needs to know if they are actually completing the exercise anywhere near technically acceptable. Not much information is provided so as not to overload the athlete (2, 5). The numerous, smaller aspects of technique are of little concern at this stage. The coach should focus on the big picture. After the set (or sometimes after a rep), feedback is provided concerning the outcome. This is more important than the performance to athletes at this low

they would be in the novice stage of learning for that new exercise. Therefore, coaches should start with teaching the basic skills and progress from those basic skills based on the stages of learning and acquisition.

Novice athletes should perform very basic exercises that are easy to learn and easy to coach (2). The basic exercises may also be the most appropriate for developing strength, hypertrophy, and neural control in beginners (1). Complex skill exercises are unwarranted for beginners (1, 2, 5).

For example, for an athlete to perform the power clean from the hang (a complex skill), they should most likely have completed at least 2 cycles of strength training consisting of basic exercises (e.g., two 8-week cycles). Some of these basic exercises would entail skills that transfer to the more complex skill exercise. Thus the complex skills are reserved until the athlete has related motor skills ingrained in the neural system (e.g., power shrug, upright rows, and front

squats are basic motor skills that are related and adaptable to the power clean from the hang). The power clean from the hang is far easier to teach if two 8-week training cycles containing the basic skill exercises of upright rows, power shrugs, and front squats have been completed.

Thus, the transition from the basic skills to the complex skills need not be that difficult if the basic tenements of skill acquisition are followed. First learn basic skills and then build on the basic skills by *chaining* and *shaping* aspects of basic skills into a complex exercise (2, 5). Chaining refers to breaking down more complex skills into more manageable components and then linking these various parts together, shaping them back into the complex movement (2, 5). Teaching strength exercises to novice resistance trainers should focus on the basic skills. These basic skills will underlie the success of teaching more complex skills to the athlete at a latter stage.

Table 2
Stages of Learning and the Use of Verbal Reinforcers With Intermediate-Level Athletes

Ongoing Coaching of a Strength Training Exercise With a Stage 1 Intermediate

1. Coach prepares the athlete by getting him or her to focus on key aspects of technique.
2. After each repetition, the coach can provide simple praise, a positive reinforcer, and a corrective reinforcer.
3. After the set, the coach provides simple praise, positive reinforcers, and more detailed corrective information.

Ongoing Coaching of a Strength Training Exercise With a Stage 2 Intermediate

1. Coach prepares the athlete by getting him or her to focus on key aspects of technique.
2. Coach can provide corrective reinforcer during rep, if necessary.
3. After each repetition, the coach may provide simple praise, positive reinforcer, and a corrective reinforcer.
4. After the set, the coach provides simple praise, positive reinforcers, and more detailed corrective information.

level of experience. Thus, a simple demonstration, identifying only 2 to 3 key aspects of technique, followed by plenty of practice and simple feedback concerning the basic result, is the key to teaching strength exercises, or any sport skill, to novices (2, 5).

■ Intermediate Stages of Learning

There are 2 distinct stages of intermediate-level learning (2, 5) (Table 2). The first intermediate stage is where the athlete has some limited mastery of the exercise (5). At this stage, the athlete can be provided with feedback after a repetition, thereby rectifying any mistakes during the ensuing repetition(s). The second stage is where the athlete has gained enough motor control to respond to feedback provided during a repetition (5).

With gradual progress from the novice stage of learning, the

athlete practices the exercise over a number of sessions or weeks, concentrating on the key aspects concerning technical performance. After a number of sessions or weeks, the coach can start to provide feedback after a repetition because the athlete will not be as overloaded with new verbal and kinesthetic information as is the novice. Gradually, more information is provided after a set concerning flaws in technique and their consequences. The athlete should concentrate on the key aspects of technique rather than the outcome of the exercise. Over the duration of a training cycle, the cues become more concise (i.e., fewer words are necessary to imply what the coach wants to do to correct technique). Martinuik states, "the judicious inclusion of these cues by an instructor becomes an important factor during this stage of learning" (5, p. 210).

In the final refinement stage of

the intermediate-level athlete (5), the athlete should be able to process cues while performing the skill. He or she has cemented the skill into a neural pattern (motor schema) that can be easily and fluently modified during the repetition. This reflexive based modification of technique during the actual repetition should be invoked by the simple use of 1 or 2 key words by the coach. Examples for the squat might be "Head up," "Knees out," "Onto heels," "Back flat," and so on. Even more concise cues could be "Head," "Knees," "Heels, and "Back." Thus, feedback is based on knowledge of performance for intermediate athletes, as compared to knowledge of outcome for novices (2, 5).

For the final learning stage for intermediates, it must be noted that the lifting speed is also much faster, allowing less time for corrective refinements during a repetition—unless they have become reflexive-based refinements. Conversely, it is of little use providing novices feedback during repetitions; they will have difficulty processing that information and will most likely have finished the repetition before they could actually make modifications to technique (2, 5).

Consequently, the use of coaching cues is related to the stages of skill acquisition (5). Because the basic outcome of a strength exercise is more important for novices, very little work is done with coaching cues during the set (2, 5). The information about technique is mainly provided after the set. For intermediates in stage 2 of learning, coaching cues can be provided after a repetition so that the corrective behavior can be quickly considered and responded to during the following repetition. Intermediates in the third stage of skill learning can be

provided with cues during a repetition. They have developed the motor schema to respond to cues in a reflex-based manner (2, 5).

■ Coaching a Complex Skill Strength Exercise

When athletes have successfully completed 2 or more cycles of training, it may be prudent to introduce some more complex power exercises if they are deemed necessary. Some examples are power clean from hang, push press, and jump squats. However, this process should not be too difficult if the proper processes of skill acquisition, as discussed previously, have been followed. A complex exercise is merely a collection of less complicated parts that have been learned previously and then chained together and shaped into the final complex skill. The part-whole method (5) of teaching, whereby the parts of a complex exercise are learned separately and then chained back together to form the whole complex skill, is best suited to complex skill exercises (5).

As discussed previously, the power clean from the hang could be considered a combination of the power shrug, upright row, and front squat. If these 3 basic exercises have been taught and mastered over 2 or more cycles of training, then the adaptation to the complex skill of power clean from hang is not very difficult. The athlete merely has to chain these 3 basic skills together and shape them into the final appropriate skill. Thus, the athlete learns by chaining together easier skills such that they flow together and become the complex skill.

If slow clean pulls from the floor or from midshin (bar elevated on boxes) have also been performed, then the final progression to the power clean from the floor

will not be too difficult. The transition will merely entail chaining together the previously learned exercises.

If a coach knows that certain complex exercises need to be done in the future, they should ensure that the basic skills for those complex exercises are performed in earlier training cycles. This especially applies to the Olympic-style lifts.

■ Analyzing and Modifying Technical Behavior Past the Beginner Stages

In the quest to ensure athletes become strong and lift with good technique, the strength coach is always analyzing, reinforcing, or modifying technique. Good technique can be defined as the technique most suitable to an athlete in which they can lift the heaviest loads in the most biomechanically sound positions. An athlete cannot attain their strength or power potential without good technique.

The coach should have a sound knowledge of the biomechanics of the exercises they coach. This includes the multiple variations in technique between novices, intermediates, and elite performers. Coaches may also need to know some basic premises that influence decisions on how to perform strength training exercises. Once these basic premises are known for a number of exercises, the coach can attempt to modify the technical behavior of the athlete to develop the most biomechanically sound lifting behavior.

In my experience, novices, especially women, take a narrower-than-perpendicular grip when learning the bench press. Generally, this is because their shoulder strength lags behind the strength of their arms at the novice stage. With increased training experience, a perpendicular grip be-

comes most suitable. It ensures the most equitable muscle involvement and best develops strength across a number of grip variations. After this training experience, individuals can work to their strengths and work upon their weaknesses. For example, my experience dictates those with long arms and strong chests tend to take a wider grip to lift the heaviest weights. Those with shorter arms take a narrower grip to lift the heaviest weights. However, neither grip needs to be used exclusively.

From a practical coaching viewpoint, the coaches should attempt to position themselves at a point that allows for the best analysis of technique while the athlete performs the set. If possible, they should not spot the lift, leaving this task to another competent athlete, so that the coach's entire focus can be on technique analysis. For analyzing most multi-joint exercises, coaches should position themselves at the side of the lifter. This allows coaches to recognize when the joint alignments become less efficient during a lift. Recognizing the correct alignment of various joints during the various stages of a lift is one of the most important skills of a strength coach. The correct alignments need to be positively reinforced. Once an incorrect alignment is recognized (an error in technical behavior), the coach must put into practice corrective procedures. This may include the use of corrective cues or key words.

Thus, the ongoing coaching process past the final learning stage is inextricably linked to technical analysis and modification. Technical analysis is based on a sound knowledge of lifting biomechanics. Modification of technical behavior is based on positive reinforcement of the correct aspects of technical behavior and the use of

coaching cues to modify the motor schema in situations where incorrect joint alignments have been detected.

■ Motivation

Motivation in strength training is the athlete's desire to possess good technique, desire to train, and punctuality. Motivation is also persistence in these characteristics (7). Wilks (7) states that motivation is a characteristic that can be largely controlled by the coach. He states that the 2 main ways for motivating athletes in strength training are through goal setting and reinforcement.

■ Motivation and Goal Setting

Motivation depends heavily on goal setting and goal attainment (3, 7). Goals may be defined as short, medium, and long term. Goals may also be defined as objective (a 1RM of 100 kg) and subjective (good technique in the squat). A strength coach must address both forms of goal setting because strength and power development are inextricably interwoven with good technique.

The coach provides the athlete a written program in order to initially develop the concept of motivation and goal setting (7). A program with all variables of strength training accounted for documents the athletes training goals for the next 8-week cycle (1, 7). Thus, there are workout, weekly, mesocycle, and macrocycle goals prescribed. These goals are principally in the form of the weight to be lifted for a designated number of repetitions.

Wilks (7) has identified a number of features of goal setting specific to the strength coaching process. Goals should be realistic, specific, and publicly affirmed. Furthermore, there should be multiple goals that need to be

reevaluated and modified so that they remain realistic. For example, the practice of testing for a 1RM or 3RM in the squat or front squat, chin-up, and bench press and then prescribing retest goals is a sound method for developing motivation. From test and retest results, the coach can prescribe goal weights to be lifted for every set of every exercise for every workout for the athlete. Immediate workout goals are an important part of the goal setting and achievement process. If the training weights that are prescribed become too difficult or easy, then they should be modified to ensure that the goals remain realistic.

“Perhaps the single most important method for reinforcing the behavior of good technique in strength training is the use of verbal reinforcement during the set or immediately after its completion (7).”

■ Motivation and Reinforcement

A reinforcer is “any event that increases the rate of occurrence of a particular behavior” (7, p. 56). Positive reinforcers are the most effective methods of reinforcing behaviors and may be classified as achievement, sensation, and verbal reinforcers (7).

■ Achievement Motivation

Achievement is linked to the process of goal setting and is a very powerful motivator for ath-

letes (3). For example, grading of strength performances with a body-weight normalizing equation (e.g., the Wilks formula from powerlifting) can help to reinforce goal setting and attainment. This also reinforces the coaching process and instills a sense of achievement in all participants. Testing that includes 4 different strength measures (bench press, chin-up, back squat or front squat, and total strength) means most athletes may at least make the top half in 1 measure when strength is normalized according to body weight. Grading can also be done against the norms of the top athletes in a sport. Thus, achievement reinforcers help cultivate motivation as athletes strive to achieve goals that have been set for them.

■ Sensation Motivation

The quest for perfect technique with heavy loads should be of paramount importance. The coach and athlete should strive to achieve perfect technique and constantly reinforce this behavior to the neuromuscular system as the appropriate behavior. If an athlete completes a perfect repetition, it should be immediately pointed out to the athlete while the sensation is still clear in the athlete's mind and body. The feeling of a perfect repetition in lifting is similar to the feeling of any perfect sport skill. The athlete will want to experience that sensation again.

■ Verbal Reinforcement

Perhaps the single most important method for reinforcing the behavior of good technique in strength training is the use of verbal reinforcement during the set or immediately after its completion (7).

This verbal reinforcement should contain simple, positive praise; specific, positive information concerning performance

Table 3
Verbal Reinforcement Cues Appropriate for Coaching or
Correcting Technique in Strength Training Exercises

Exercise	Starting Position	Eccentric	Concentric
Squat	"Butt in, chest up, deep breath."	"Butt back; onto heels."	"Hips through."
Front squat	"Butt in, elbows up, deep breath."	"Elbows up; onto heels."	"Hips through."
Bench press	"Tight, chest up, shoulders back."	"Control the weight."	"Blast, to eyes."
Power shrug	"Chest up, elbows out, back flat."	"Butt back."	"Explode up; hip drive."
Push press	"Butt in, torso tight, elbows up."	"Quick dip."	"Up and back."

(technique); and corrective information if warranted (7). The simple praise is a reward for the athlete's effort. The positive technique reinforcer encourages the athlete's correct use of good technique, and the corrective reinforcer is used to modify an incorrect aspect of performance. After the completion of the entire set, a more detailed analysis can be given to the athlete while the sensation of the lift is still clear in the athletes mind (7).

Extensive verbal reinforcement is most appropriate for novice resistance trainers following a set. Extensive information cannot be effectively processed when the higher cortical centers are in the high state of arousal needed to lift heavy weights (7). Detailed verbal reinforcement is best given at the end of a set, when the athlete can fully concentrate on the information.

The verbal reinforcers for intermediates must be concise. The coach uses cues or key words that equate to certain behaviors. That is, 1 key word means the athlete should invoke a certain behavior or technical refinement during lifting. Two or 3 cues also allow the athlete to focus his or her attention and not be distracted by irrelevant information or stimuli (3, 6, 7).

For example, coaching the squat with an intermediate who

has a habit of letting the chest drop—a mistake that results in the hips not being pushed through during the concentric portion of the lift—could be: "Good. Strong. Chest up and hips through more." The cues could even be shortened to "Good. Strong. Chest up."

A certain understanding between the athlete and the coach must exist that underlies the success of the use of cues or key words. The coach must explain that if the word *chest* is said as a corrective reinforcer, it means the athlete has made a slight mistake in technique related to the chest position. After hearing the word *chest*, the athlete should keep the chest up.

The corrective behavior exhibited by the athlete in response to this cue may be to automatically lift the chest higher and take a deeper breath before the ensuing repetition. Consequently, the incorrect behavior (technical flaw) will be corrected by invoking this response.

Table 3 contains a number of key words and technique cues that are useful for coaching the novice to low intermediate stages of technical development. These cues have been developed through my experience with novice and intermediate-level athletes. Some cues are most appropriate during the set-up phase of a repetition,

some during the eccentric phase, and some during the concentric phase. Thus, between or during every repetition, the coach can provide a verbal reinforcer of what the athlete is to do regarding technique.

Table 4 contains an example of the verbal reinforcers for an entire set of squats for a latter-stage intermediate-level athlete who is in a high state of arousal to lift a very heavy weight. Note that the coach provides less information during the set as compared to after the set for the latter-stage intermediate athlete (7). This is because the athlete is better able to modify the behavior of the rep with just 1 or 2 key words or cues. Because of their greater control over the motor skill, these technical changes occur at the low-level controller (4) of the neural system, leaving the higher cortical level to think of invoking them (5). The cognitive centers of the higher level controller (i.e., brain and supraspinal centers) are reserved for generating the high levels of arousal necessary to lift heavy loads (4, 8).

Therefore, the use of verbal reinforcement is critical to the ongoing process of perfecting and modifying technique. The 3 parts should be simple praise, positive reinforcer, and corrective reinforcer. For novices, they may be

Table 4
Examples of Use of the 3-Part Verbal Reinforcers by the Coach During and After a Set of Heavy Squats Performed in the Final Stage of Learning

While Setting Up		
“Come on. Tight and strong, chest up, hips pushed through.”		
During or After the Repetition		
Athlete’s Performance	Positive Praise	Corrective Reinforcer
Good technique.	“Great.”	
Good, but chest low.	“Good. Strong.”	“Chest up.”
Good technique.	“Great rep,blasting it.”	
Wobbly at bottom.	“That’s it.Good recovery.”	“Stay tight, tight, tight.”
Good technique.	“Excellent. Tight and controlled.”	
After the Set		
“Great stuff. Very strong out of the bottom. Focus on staying tight and getting your chest up every rep to make it perfect. If the torso gets slack and you let the chest drop, you will get bent over and use too much back, rather than legs, to lift the weight. Next set, stay tight and keep your chest up.”		
<p><i>Note:</i> The coach provides few bits of information during the set and more after the set. This is because the intermediate level athlete is better able to modify the behavior of the repetition with just 1 or 2 key words or cues. After the set, once the athlete no longer has to focus on lifting and staying motivated, more detail can be given.</p>		

delivered by a coach after a set. For athletes in the second stage of learning, the cues can be given after each repetition and after the set. More advanced athletes who display good control over technique can be provided with corrective reinforcers during a repetition so that they may immediately modify that repetition. As athletes become more advanced, they require less information to correct a flaw in technique. It is important not to overload an athlete with information when they are attempting to concentrate on lifting heavy loads (7, 8). For this reason, when coaching advanced athletes that are lifting heavy loads, use only 1 to 3 simple words. These words should imply much more to the advanced athlete (7, 8). Do not distract the more advanced athlete’s focus with a steady stream of frivolous words; they need to center their attention (3, 6–8). Learn what key words work best for each

individual, and learn when and how to deliver them (7).

■ Conclusion

A primary role of the strength coach is to teach strength exercise skills to novice and intermediate-level athletes and to ensure those athletes consistently display good technique in those exercises. This is initially accomplished by following the basic tenants of motor skill learning and motor control. In the 3-stage process, teaching methods are slightly modified for each stage of learning through which the athlete progresses. The basic strength exercises generally entail basic skills and are most appropriate exercises for novices. Complex strength skills are not warranted for novice athletes.

Motivation is based on goal setting and reinforcement. Goals for the athlete need to be specific, challenging, and continually mod-

ified to keep pace with the athlete’s progress. Achieving goals motivates athletes and reinforces the benefits of the entire training process.

Reinforcement methods may also be used to solidify good aspects of technique and to modify technical flaws. The 3-part positive verbal reinforcement system, provided during or after a set, has proven to be a most effective means of reinforcing correct technical behavior and modifying incorrect technical behaviors. ▲

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