

Starting Strength

The Science of Verbal Cues: Turning Words into Action

by

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What is your mission as a coach? When you're working with a trainee, what are you aiming for?

In Flanick and Rippetoe's article [What is a Coach?](#), a movement coach is defined as “a teacher who uses a model as the basis for instruction of a movement. A model is developed by establishing a set of criteria that serve to create the most efficient and effective movement patterns for the purpose of that movement” [1]. Simply put, the objective of a coach, similar to that of a teacher, is to optimize retention by stimulating as much long-term learning as possible per unit of time spent with a student. Studying how that is best done enables us to improve our coaching effectiveness.

Whether you are a coach or a trainee, you may have experienced working with a very talented coach and learning a lot from them in a short amount of time. Studying their writing and watching their YouTube videos may be helpful, but spending time working with them in person and receiving instruction and feedback boosts the learning experience tremendously. The way these coaches present information leads to long term learning – how are they doing that? Highly efficient and effective coaches are teachers who communicate with their trainees in a fundamentally different way. They intuitively grasp how to present information that will help the trainee make the connections necessary for deeper learning, learning that will last. Teaching this way is a complex skill that can be acquired through study, experience, and training. The best coaches realize that learning is an active process and how they communicate can set up their students to participate, thus learning through their own actions.

Learning

Our ability to learn and adapt may be our most powerful asset as human beings. Broadly defined, *learning* is acquiring knowledge or behavioral responses from experience. Memory is the result or product of learning. It is the record of learning stored as physical changes in the brain that allows information to be retrieved later on [2].

Human beings use different learning systems depending on what they are learning. Learning explicit, conscious information is fundamentally different than learning unconscious, implicit information. This fact has important implications for us if we want to optimize our learning. Strategies that are very effective for learning anatomy and physiology might not be the best strategies to use when

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learning how to squat. If we want to optimize learning we need to tailor the strategy to the kind of information we're trying to learn. This essay will focus on strategies for skill acquisition, which is the process of converting explicit, declarative knowledge into implicit, procedural skill [2,3]. This is best understood as *turning words into action*.

What does it mean to learn and how can we tell if a trainee has learned something? Is trainee performance in a training session an indicator?

A trainee's performance is observable and accessible to the coach in the moment [4]. It changes during a training session as he responds to instruction and feedback while on the platform. If the session started with problematic form, then the trainee's performance may improve over the course of the session and be noticeably better by the end of the session. This improvement may or may not reflect actual learning, however.

Learning reflects a permanent change in the ability to perform, and is measured by an evaluation of retention over time [4]. Retention across sessions of the changes developed under the coach's guidance is what demonstrates learning. It is the desirable outcome of skilled coaching. Importantly, it is also the result of active problem solving on the part of the trainee.

A retention test measures the current un-coached performance of a trainee against previously coached performance: has the effect of the earlier coaching been retained? Learning is measured against a baseline performance of a trainee, not against an ideal model.

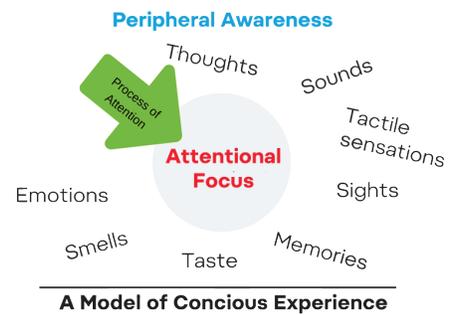
An example of a retention test in barbell coaching occurs when the coach is watching the trainee warm up without providing instruction. In this scenario, the coach is assessing whether the trainee retained the improvements made during previous training sessions. In the example of online coaching, this occurs when the coach receives a video of a trainee's work set on a later date following initial instruction. How much the trainee has retained from earlier sessions is a measure of the effectiveness of the coaching thus far.

This relationship between learning and performance explains the phenomenon that coaches in all disciplines encounter: trainees forget. How do we explain a movement error that is fixed one day on the platform but shows up again the very next session? The trainee is capable of performing under instruction and feedback but has not yet learned how to solve the movement problem themselves. They can perform but they have not learned, and this is demonstrated through the lack of retention.

As a coach or a trainee it is important to understand that poor performance within a training session is not necessarily indicative of someone not learning [4]. Quite often, an initial decline in performance in response to a cue leads to the active problem solving processes required to create more permanent changes. Setting up a condition that produces an error and an accompanying increase in awareness in the trainee is often the very condition that produces the most learning. Poor performance at the next training session, however, means adequate learning did not take place.

How to Think About Cues to Optimize Learning

Instruction can be considered any information given in an effort to teach the athlete an efficient movement pattern. A *cue* is **a reminder of something already** taught that focuses the attention of the trainee, and is meant to nudge the trainee in the right direction. Traditionally, movement coaches describe cues as verbal, visual, and tactile. These three types of cues describe the method through which



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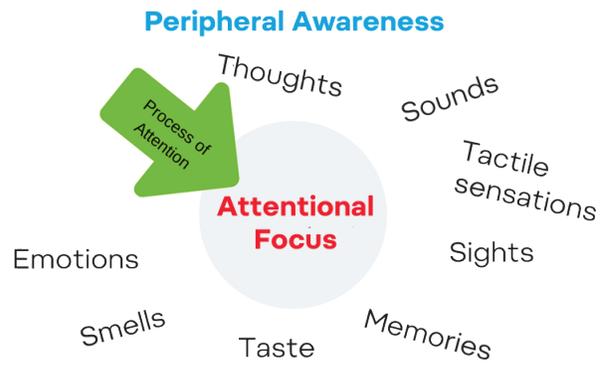
communication between coach and trainee occurred. For example, if the coach places his hands on the trainee's hips to obtain hip drive, he is using a tactile cue to elicit a kinesthetic response. Describing cues with these three adjectives is highly useful for communication between coaches to describe how the information was provided to the athlete.

However, if the goal is to optimize learning, the effect of a cue on the trainee's attentional focus needs to be understood.

Attention is the mechanism by which our brains select and prioritize information that is most relevant to our behavioral goals [5]. External sensory perceptions (sights, sounds, smells) and internal mental objects (thoughts, feelings, memories) give rise to more information than is possible for us to process so we limit our focus to what we believe is most important. This process of information selection is broadly defined as attention. Similarly, *attentional focus* refers to what we are concentrating on at a particular moment in time. It is the center of our conscious experience.

We also can be more generally aware of the background at the same time as we are concentrating on something. This background can be defined as our *peripheral awareness*. Both our attentional focus and our peripheral awareness create a model for us to understand our consciousness experience [6].

Consciousness consists of whatever we are experiencing in the moment. Our field of conscious awareness is made up of both sense perceptions and mental objects. Our attentional focus and peripheral awareness together form our *conscious experience* [5]. The attentional focus of a trainee can be manipulated through the use of verbal, visual, and tactile cues either internally on body movements or externally on the result of the movement.



Internal Cues

Internal cues focus the attention of the trainee internally on body movements, attempting to consciously control joint angles and body positions through thought [7,8]. Common examples of internal cues include: knees out, chest up, reach back with your hips, arms straight, elbows up, and shrug. These types of cues usually, though not always, follow a similar structure of the naming a body part followed by an action. Internal cues focus on a singular aspect of a more complex movement. They represent the default communication style most physical coaches use when initially attempting to coach.

This default style of cueing is most likely an artifact of the language of anatomy, biomechanics, kinesiology and exercise physiology [9]. Internal cues are derived analytically by deconstructing the movement into many parts. In school and in text books, we learn about movements by studying and thinking about them. In this environment, all communication is verbal and thus constrained by the scope of our language. The problem with this method is that motor skills are learned most efficiently and effectively by initiating and experiencing actions. How we think and how we do are entirely different things. An honest assessment of this situation reveals that we are much better, as a species, at *doing* than we are at *thinking* when it comes to solving motor problems. No one ever learned how to ride a bike by sitting and thinking about it [3].

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An internal cue gives the trainee a solution to the problem, and can be thought of as learning by instruction. It has been the experience of many practitioners that using cues that internally focus the attention of the trainee are most useful when the trainee, most likely a novice, has no point of reference from which to solve a problem. This most frequently occurs during the first few sessions of training. In this instance, a simple command may convey the information necessary for the trainee to understand. This understanding becomes evident when the trainee no longer needs a cue and becomes able to self-correct after the initial intervention.

External Cues

Unlike internal cues that focus the attention of the trainee on the movement of a body part, external cues focus the attention of the trainee on the result of the movement [7,8]. External cues are task or goal orientated. Whenever the coach is drawing attention to a feature of the environment (dot on the floor or ceiling, a wall, a barbell, TUBOW, foam roller, or baseball, etc.) or is using analogy (it is a jump with a barbell) the coach is providing an external cue. External cues differ from internal cues in that they do not instruct the trainee how to move, but rather create a task or goal that the trainee must figure out how to accomplish. This need to figure out requires active problem solving from the trainee. This active problem solving process is the crucial component in generating long-term learning.



External cues can be thought of as learning by discovery because the trainee discovers his own answer to the problem.

The concept of attentional focus cueing was first introduced through the work of Wulf et al [8]. This study involved two experiments. The first experiment, examining the effect of external versus internal focus, was conducted on a ski-simulator. The group receiving external focus was instructed to “exert force on the outer wheels” while the internal focus group was instructed to “exert force on the outer foot,” and the control group received no instruction. The subtle difference in focus resulted in statistically significant improvements in performance and learning as seen on a retention test [8,10].

The second experiment examined external versus internal focus in cueing a balance task while standing on a stabilometer. The external group was asked to keep the red lines marked on the stabilometer in front of their feet the same height while the internal focus group was asked to keep their feet at the same height. The results were again in favor of the external focus group, which had significantly fewer errors during the retention test [8,10].

Since this initial experiment, there have been hundreds of experiments examining the effect of attentional focus on virtually every physical domain. A 2013 literature review, *Attentional focus and motor learning: a review of 15 years* [7], found that external cues outperformed internal cues in both performance and learning in both movement effectiveness, such as balance and accuracy, and movement efficiency, as measured by muscular activity, maximum force production, speed, or endurance.

A movement pattern is considered more efficient or economical if the same movement outcome is achieved with less energy expended. In the context of barbell training, this is a vertical bar path. This literature review found that external focus speeds up the learning process, enabling performers to achieve a higher level of expertise sooner. It was also found that external focus had a stronger effect

on learning in spite of the performer's focus preference. It is also interesting to note that an external attentional focus has been found to decrease total muscular activity while simultaneously increasing maximal force production. Isn't this counter-intuitive? Why is this happening? What is so unique about where we direct our attentional focus that it can have such a profound impact on learning?

The Constrained Action Hypothesis

The constrained action hypothesis (CAH) states that an internal focus, likely triggered through an internal cue, produces a conscious type of control, or override, that causes the individual to constrain their motor system by interfering with automatic control processes. This internal focus can link semi-independent body segments and can spread inefficiency at a general level by producing co-contractions and micro-choking episodes. In contrast, an external focus, likely triggered through an external cue, allows the system to naturally self-organize, unconstrained by the interference caused by conscious control attempts, in a way that allows the individual to accomplish the task or goal. External focus promotes a more automatic mode of control by utilizing fast unconscious reflexive processes. If co-contractions decrease, the trainee will simultaneously increase total force production while decreasing total muscular activity [7].

As barbell coaches, the CAH is most evident when attempting to fix arm bend during a clean with an internal focus cue. After cueing the trainee to keep their arms straight, it is not uncommon for the coach to observe a wave of stiffening co-contraction that quickly links the elbows to the wrists and shoulders. The movement can quickly go from looking like a decent clean with a slight arm bend to something unrecognizable. The complexity of the movement combined with the conscious override of a single moving part constrains the whole motor system. Next time you might try an external equivalent "keep the bar as close to the floor as possible before touching the jump position." Both of these cues are attempting to fix the same thing but how the trainee goes about fixing them will be two entirely different experiences.

The important thing to note with the above example is not the specific instructions or cues themselves but that any instruction and corresponding cue, with a sprinkle of creativity, can be reframed from an internal focus into an external focus. Next time you might try directing the trainee's attention externally with the instruction "keep the bar as close to the floor as possible before touching the jump position." During the set, in-between repetitions, this instruction can be cued as "bar close to floor." Both of these solutions are attempting to fix the same problem but how the trainee goes about fixing it will be two entirely different experiences.

Socratic Coaching

Deemed the "Socratic Coaching" technique in a conversation with fellow Starting Strength Coach Karl Schudt, I've personally been experimenting with a coaching technique that has helped increase performance and learning with trainees who suffer from persistent technical flaws. These are the types of errors that are typically fixed for a few repetitions at the end of a session but continue to reappear the following session. First, create an external objective that, if accomplished, will fix the movement error. Before the set begins tell the trainee that between repetitions you will ask them if they accomplished the goal and they must answer yes or no. It is essential that no other cues be given when performing this technique. An initial performance decrease for a couple of reps is to be expected.

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This technique forces the trainee to hold themselves accountable for accomplishing the task. The increased accountability creates a sense of urgency and awareness that could not be previously obtained in prior sets. This increased awareness is what allows the trainee not only to recognize the error they continued to make but gives them an opportunity for the first time to figure out a way to correct it themselves.

A consciousness of wrongdoing is the first step in the process of self-correcting [11]. Many trainees lack the awareness of what they are doing wrong even if they can demonstrate a correct performance when instructed. Part of this is because the trainee simultaneously wants to set a personal record as well as correct his technique. The Socratic Coaching technique allows the trainee to catch themselves in the act of wrongdoing, thus opening the door for learning.

Conclusion

The goal of any movement coach is to stimulate as much learning as possible per unit of time spent with a student. In order to reach higher levels of skill, a trainee will need to become more self-sufficient in recognizing and correcting technical flaws in their movements. Eventually, through the learning process, the trainee grows in the direction of becoming his own coach.

Although they are not equal, learning by instruction and learning by discovery both allow an individual to learn [12]. It is the difference between increasing your knowledge of what to do and your understanding of what to do. Facts about what to do lead to increased information, while insights lead to increased understanding. It is only through active problem solving and reflection that we can truly gain insight.

It is the job of the coach to facilitate this process for the trainee. It is the coach that creates the environment and guides the trainee's thinking, but it is the trainee himself that must do the learning. Externally focused cues are one of the primary tools of a coach in this process. By directing the attentional focus of the trainee to the result of his movements, the coach creates an environment that stimulates the active problem solving necessary for learning. In this context, what becomes most important is not what the trainee is doing but how he thinks about doing it that ultimately makes the difference in how much he learns [9].

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