

Motor Learning and Tennis Coaching

Combining Theory and Practice



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The understanding and application of the motor learning process has the potential to enhance tennis skills (developing strokes). We all know that it takes many years to become proficient at playing tennis. As coaches, we need to understand the stages of motor learning in order to become more effective practitioners.

The following question might prompt some insight into why tennis students often react or perform differently in varying contexts within tennis skill performance. When reading the question, consider why player actions occur and what can be done to correct these issues.

Have you ever coached a lesson when the student is able to demonstrate the appropriate/desired correction (based on your feedback or the requirements within the drill), but during game play, the player returns to the previous mistakes?

Why does this happen? Why can it be frustrating to both the coach and the player?

In order to understand this process, the coach and the player could benefit from an enhanced understanding of the stages of motor learning. Skills, including tennis strokes, in essence go through a three stages of learning. Fitts and Posner¹ described the Cognitive, Associative and Autonomous stages of learning that can directly be applied to learning motor skills. The following is an outline of these concepts adapted to teaching/coaching the game of tennis, but could be applied to almost any sport.

Cognitive (understanding learning)

At this stage, when applied to tennis, the player is trying to cognitively work out how to perform the stroke, and the results are likely to be inconsistent. In this learning stage, the coach will be required to demonstrate the stroke being taught multiple times, so player can visually see what is expected.

Example

A beginning tennis player is trying to perform a forehand groundstroke. When s/he makes contact with the ball, the results are varied. Some attempts go long, while others go into the net, etc. The player has to concentrate on the basic steps that are required to hit the forehand. S/he will constantly focus on understanding and trying *to perfect the grip, ready position, shape of the stroke, adjustment steps, point of contact, and follow through.*²

During the cognitive stage, practice environments need to be simple (closed skills) so that the focus can be on learning the technique. Within this stage, outside distractions or challenges need to be held to a minimum.

Associative (refining practice)

At this stage, strokes are more fluid, reliable and efficient, and there is less 'intentional' cognitive thinking (involving mechanics) taking place.

Example

The player is still thinking about the technical cues that are listed above, but not as much as in the cognitive stage. In this stage, the player is now able to rally with the forehand, and the stroke is consistency improving. The player would also be able to incorporate (combine) other strokes into the skill sequence.

An example might include beginning to execute different kinds of forehand shots and/or follow a forehand with a backhand stroke.

As a coach, you may notice that the player is starting to give you feedback that relates to tactical placement and not just technical comments. When the coach thinks the player is ready, s/he should add some level of competition that includes the newly learned stroke or strokes. In this way, they can evaluate how the player maintains his or her technique in a slightly more demanding situation.

Practice environments should be varied at this stage (open skills). (Practice environments will be presented on the following pages).

Autonomous (automatic)

Strokes are accurate, consistent and effective.

Example

The player is directly involved in playing points, and the strokes being executed resemble refinement (consistency) in a match situation. It can take many years to get to this stage. During this stage, the player is not thinking about correcting technique. S/he is using the strokes for tactical development.

An example would be what is seen at a top college or professional tennis match.

Please note: Even professional tennis players are continuing to learn. They will spend a great deal of time on the practice courts revisiting the first two stages of learning in order to rework and refine skills. However, progress for these individuals through the three stages occurs very quickly, because they are not learning the skills for the first time.

Important Motor Learning Terms

The application of motor learning theory has been a part of quality instruction within physical education programs for years, and certainly applies to quality tennis instruction/coaching as well. The following pages contain a list of terms that have application for every tennis coach. Once a coach and player understand these terms and how they are appropriate to the stages of development, all individuals within the coaching/learning dynamic can approach practice methodically. This should facilitate a better overall understanding of how motor skill learning can be applied within the tennis setting.

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Performance

"The behavioral act of executing a skill at a specific time in a specific situation."³

Students can achieve a short term improvement in motor performance without actually learning if they do not commit movement to long term memory.⁴

This term relates to the above scenario where the player is able to demonstrate the stroke in a closed environment. However, when reintroduced into an open environment, the skills generally return to past form.

Motor Learning

Motor learning is where the skill being taught is developing. "Like all learning, motor learning is inferred from behavior and represents a relatively permanent change in behavior."⁴

In the context of tennis, stroke(s) a player would be able to hit confidently in match situations. For example, being able to perform an inside-out forehand (autonomously), coaches and player need to understand the difference between motor learning and performance. Just because performance increases does not mean that learning has always taken place, although there is a strong correlation, one could improve performance because the stroke was modified.

Whole vs Part Instructions

"Base decisions about practicing skills as a whole or in parts on the complexity and organization characteristics of the skills."³

For example, the tennis coach would reveal the *whole* stroke to the player (the serve as an example), so that the player can see what the stroke looks like in a game situation. *Part instruction* is where the skill is broken down into a step by step process. This is especially effective with very complex skills. Working on the ball toss as a part of the serve in a closed environment is an example (cognitive stage of learning). Ultimately the coach wants the player to return to demonstrating the whole stroke as quickly as possible. However, as a coach, there is a time and place to implement this type of instruction.

Massed Practice

"A practice schedule in which the amount of rest between sessions or trials is very short."³

Massed practice in tennis is where a large amount of time is spent practicing a specific skill. During this type of practice, the player will hit the same shot over and over again. For example, practicing the serve for 15 minutes with no break.



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Random Practice

"Changing the skill and the order of the skill that is practiced during a practice session."⁴

Random practice in tennis involves changing the strokes being performed and the order in which they are performed. For example, the coach may set up a drill where the initial focus might have a sequence where the player hits a forehand groundstroke, backhand slice approach, forehand volley and then an overhead. When they return to the baseline, however, the sequence might be backhand groundstroke, forehand approach, overhead and then a backhand volley.

Distributed Practice

"A practice schedule in which the amount of rest between practice sessions or trials is relatively long."³

A tennis example would see the player spend 5 to 10 minutes serving, then go work on their backhand for 5 minutes, then volleys for 5 minutes, followed by a return to the serve for 5 minutes. Evidence shows that distributed practice is most beneficial, as it allows the player and the coach feel "fresher" with better focus. Distributed practice when first learning a skill is most efficient in obtaining positive results.

Blocked Practice

"Practicing the same skill continuously for a short time."⁴

In the beginning stages of learning a tennis stroke, the stroke is repeated a number of times focusing on using the correct technique. Let's look at the forehand groundstroke as an example. The player will hit a number of forehands focusing on using the correct technique over and over again. Remember this type of practice is only helpful if the player is engaged in learning. Once the coach notices the player is not engaged the coach must change to a different stroke.

Practice Variability (Open)

"Practicing the same skill in different conditions."⁴

When a skill is being learned and the context or environment is modified intentionally, variability of practice is evident. When the tennis strokes being learned are placed into various different learning environments, there is potential for transferability to game play. For example, if a player has been working on hitting topspin forehands, and the coach requires the player to begin to flatten out the forehand while being fed tennis balls from different directions and at differing heights, that is an example of variable practice.

Process vs Product

Process is concerned with the degree to which the execution of a skill compares to its most efficient form, while product measures indicate the outcome of the performance that results from the dynamic execution of components of the skill.⁵

In tennis, the process relates to swing mechanics (technique), while the direction, speed, whether the ball lands in the court, etc., would define the product. Ultimately as coaches, we want the ball to go into the court. However, if the only objective focuses on ball landing in the court (product), then technique could be compromised or adapted to make the ball go in. This can decrease long term proficiency. However, if we focus on the process, the ball might not go in initially, but the technique is correct. Over time, the player will benefit more and be more successful.

Volume

Game strategies can be more effective than simply requiring students to repeat skill attempts over and over.⁶ In other words, there are times when less repetitive practice might enhance motor performance, and certainly variety is often a positive in this process.

The volume relates to the required number of repetitions or it could relate to the amount of practice time. With massed and distributed practice, the number of repetitions should be based on the age and developmental level of the student. For example, for a player under eight years old, 10 forehands in a row might be considered massed practice, but for an advanced college player, this number combined with 20 backhand strokes might be considered distributed. As a coach, being aware of the player's age and ability level is important in determining that factor. Another consideration is how advanced the skill is that you are trying to teach. For example, the ready position for a player will not take long to master in comparison to a more complex skill like serving.

Below is a practice table (potentially used to devise lessons) that can be applied as a guide. The rating system is only a rubric involving how important each type of facilitated practice environment is, based on the level (proficiency) of the player. Obviously, each coach will decide the correct practice environment to be implemented. By understanding the concepts, the coach can plan an appropriate practice.

Scoring

- 1 = Used Often
- 2 = Used Some
- 3 = Used Sparingly

For example the stroke being emphasized in the table is the serve, but can be adapted to any stroke.

	Cognitive	Associative	Autonomous
Whole Instruction	3	2	1
Part Instruction	1	2	3
Process	1	2	3
Product	3	2	1
Mass Practice	2	2	2
Distributed Practice	1	1	1
Blocked Practice	1	2	3
Variable Practice	3	2	1
Random Practice	3	2	1
Closed	1	2	3
Open	3	2	1
Volume	2	2	1

Summary

Tennis is a complex sport to learn and involves many skills and tactics. Both the player and the coach can become frustrated when the results are not coming as quickly as they want. However, the more we can educate the coach, player and parent (when applicable) in understanding the stages of motor learning coupled with basic motor learning terminology, the more proficient and enjoyable the process of learning the game of tennis can become. The application of motor learning concepts and stages into quality tennis instruction is encouraged. Improving knowledge in this way can translate to better coaching and enhanced performance.

Resources

1. Fitts, P. & Posner, M. (1967). *Human performance*. Belmont, CA: Brooks-Cole.
2. PTR 11 to 17 study materials
3. Magill, R., & Anderson, D. (2014). *Motor learning and control: Concepts and applications*. New York, NY: McGraw Hill.
4. Rink, J. (2010). Motor Learning. In B. Mohnsen (Ed.), *Concepts and Principles of Physical Education-3rd. Ed.*(pp. 31-63). Reston, VA: AAHPERD.
5. Miller, J., Ken Vine, and Dawne Larkin (2007). *The relationship of process and product performance of the two-handed sidearm strike*. *Physical Education and Sport Pedagogy*, 67 (1), 61-75.
6. Butler, R. (2012). *Re-conceptualizing Physical Education through Teaching Games for Understanding*. UBC Faculty of Education: Vancouver, BC.

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