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MOTOR BEHAVIOR

Coaches, Athletes, and Dominance Profiles in Sport: Addressing the Learning Styles of Athletes to Improve Performance

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Abstract

The purpose of this article is to examine the background and purpose of using dominance profiles to assist coaches in determining learning preferences for themselves and their athletes. Dominance profiles can provide information that will help coaches understand the differences in how athletes think, act, and learn. Dominance profiles can help coaches anticipate how students will respond in different sport situations. Learning inefficiencies can be addressed and strategies can be developed to enable athletes to adequately learn to process all types of information without undue stress. This paper's focus is on the practical application of dominance profiles in coaching that can positively affect placement and positioning of athletes, teaching for skill enhancement, and the impact of dominance on athletic performance.

Each season, athletes participate in sport with vast differences in ability, understanding, and performance that make coaching a big challenge. The coach is able to observe daily the diverse levels of fitness and skill performance of individual athletes. Diversity among athletes adds a significant level of personality and depth to each

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team. One question that is often ignored in the athlete's assessment involves an understanding of how they learn and process cognitive information.

Learning styles are various approaches or ways of learning. Coffield, Moseley, Hall, and Ecclestone (2004) state "they involve educating methods, particular to an individual, that are presumed to allow that individual to learn best." Learning style theorists continue to be controversial regarding the impact that learning styles can have on the teaching and learning process. The learning style approach comes from the shared notion that students prefer to learn differently (Diaz & Cartnal, 1999; Fleming & Bonwell, 2001; Fleming & Mills, 1995; Snyder, 2000). Coffield et al. identified a continuum of learning style theory. Theories at one end were considered to be fixed (a trait) and at the other end were considered to be produced styles that considered learning to be mutable (a state), where learners are able to move between learning styles. The question of whether learning can be fixed or mutable is important because the answer enables us to determine if teaching and learning styles can be matched and truly individualized.

Although, limited evidence exists on the value and validity of learning style assessments in regard to athletes, the research (Dunn, 2008; Dunn, 2009; Fleming & Bonwell, 2001) implies that students and athletes learn best when both the teaching style and the learning style match. If previous learning experiences and environmental factors create varying learning preferences for students in school, then coaches may also experience similar differences in their athletes. Recent research in the area of coaching has also shown evidence of differences between the learning style preferences of coaches and athletes (Dunn, 2008). The difference in these preferences are greatest at the high school and college level, but as athletes rise to elite levels of performance, the differences between the two diminish (Dunn, 2008). Coaches need to be skilled communicators and technically sound in their knowledge of sport (Danish, Petitpas, & Hale, 2007), and an understanding of learning preferences can assist them in this area.

Coaches with an awareness of learning style approaches can include these techniques in the teaching environment to enrich the athlete's learning and possibly impact performance in a positive way. Coaches must be careful not to use learning preferences to stereotype or label athletes to a fixed style of learning, but rather they must use

them as an option to augment the teaching and learning process. If learning is mutable, then coaches need to be aware that different situations will call for different preferences for learning. Cassidy, Jones, and Potrac (2004) suggested coaches that are familiar with their own learning preferences can better evaluate how these preferences might hurt or help certain athletes. Matching teaching methods to learners' preferences can produce positive results and increase motivation where differences in learning preferences may affect the teaching–learning environment in a negative manner (Deluca & Downs, 2006; Felder & Brent, 2005). The teaching of skills, especially to young learners, leaves little room for perceptual differences between coaches and athletes. Athletes are called upon to make quick choices and decisions. Any delay in the process can result in a negative performance or missed opportunity. Coaches that understand the athlete's dominant preferences may be more prepared to teach athletes how to make appropriate choices and perform in stressful conditions. The challenge is to find an appropriate system to determine the learning preferences that produce positive results for all participants.

Defining the Dominance Profile?

A single learning style assessment system that has intrigued scientists and educators for decades is that of the dominance profile. A dominance profile is a personal assessment technique that gives information about how we take in and process new learning experiences developed through the work of Carla Hannaford (2005) and Paul Dennison (1985). The dominance profile isolates individual aspects of the learning process and is one method of determining learning style preferences.

Out of the learning styles, dominant preferences emerge for the brain, eye, ear, hand, and foot. An individual's learning style depends on the ways that his or her learning organs/senses are neurally linked. We all prefer to use one side of the body/brain more than the other. These preferences can develop due to socialization or indoctrination; for example, a child may prefer to throw with his or her right hand or listen with his or her left ear and others see best with their left eye. These dominant preferences carry over to the sports arena as well and may evolve beyond preferences for throwing, kicking, or catching, to preferences for placement on the field/court or to understanding assignments in a game.

The purpose of this article is to examine the theoretical application and potential use of dominance profiles in the field of athletics. The implications of the concepts in this article are limited until more in-depth research can be completed and applied to specific aspects of sport. Dominance profiles may impact coaching and sport and provide information for coaches that can help to identify the differences in how athletes process information and learn.

Learning Preferences to Dominance Profiles

The dominance profile is a personal assessment technique that helps us understand how and why we learn in different ways (Hannaford, 2005). The dominance profile can be thought of as a road map of the individual's specific base learning style. When we are confronted with a new learning experience, we access information most easily through our dominant senses. Dominant preferences in relation to our brain, eyes, ears, hands, and feet evolve through environmental and programming influences we experience each day. The brain is an important component in determining how we learn, but the brain cannot learn by itself. Our eyes, ears, hands, and feet are all mechanisms for transporting information to the brain. The hands, eyes, ears, and feet need to be fed information that the brain can use to make appropriate decisions about learning.

The role of the right and left hemisphere has been discussed for centuries (Binney & Janson, 1990) with a great deal of debate over the function and purpose of each hemisphere. Researchers (Ornstein, 1997; Wolfe, 2001) agree that each side of the brain has its specialty functions, but that neither side can operate efficiently without the other. The dominance profile examines the special attributes of each hemisphere, but both sides must work together in concert to enhance learning.

The left hemisphere is known as the logic dominant hemisphere and deals mainly with details and individuals that are logical in their thought processes and activities. The disadvantage of being left-brain dominant is in missing the big picture. Individuals will see the parts that make up the picture, but fail to put it all together into a coherent piece (Hannaford, 1997).

The right hemisphere is known as the gestalt dominant hemisphere and deals mainly with global or whole brain processing (the big picture). Hannaford (1997) says these individuals are visionary and creative in developing grand ideas for projects and people, but have

trouble developing the steps to accomplish the grand ideas. Right brain dominants see where they need to go, but miss the steps along the way that would get them there (Hannaford, 1997).

What Makes Learning Easy or Difficult?

Research reveals that the left side of the brain controls the right side of the body and vice versa. Therefore, the dominance profile that elicits the most efficient situation for learning (known as dominant efficiency) depends upon whether the dominant eye, ear, hand, and foot are opposite the dominant brain hemisphere (Table 1). This includes individuals that are right brain and left eye, ear, hand, and foot (or the opposite). This creates the best situation for learning because the dominant brain controls all the dominant senses. The person with this profile may be able to take in information and process it without difficulty (Hannaford, 1997).

Table 1

Dominant Efficiency

Dominant Hemisphere	Dominant Sense	Learning Style	Other Examples
Left Brain	Right Eye	Visually	Efficient Right Brain/Left Eye
Left Brain	Right Ear	Auditory	Efficient Right Brain/Left Ear
Left Brain	Right Hand	Verbally Efficient	
Right Brain	Left Hand	Kinesthetically Efficient	
Left Brain	Right Foot	Movement	Efficient Right Brain/Left Foot

Learning can be difficult (known as dominant inefficiency) when the dominant brain hemisphere is on the same side as the dominant eye, ear, hand, and foot (right brain and right eye, ear, hand, and foot or the opposite) or when there is a mixed dominance (right brain, right eye and left ear, hand, and foot). In such cases, the dominant brain does not control the dominant senses, so the athlete is unable to function at optimum efficiency. Dominant inefficiency can be understood by imagining how successful you would be, if you had to throw or shoot with your nondominant hand during a game. You could make the pass or the shot, but it would be difficult and your proficiency/success would be very low.

We can function when the dominant brain is on the same side as a dominant sense, but it is not as efficient. In addition, efficiency

is further decreased during times of new learning or stress. The eye, ear, hand, and foot that is directly connected to the dominant hemisphere on the opposite side of the body is more likely to maintain communication during times of stress. Communication in the modalities that feeds directly into the nondominant hemisphere will be inhibited under stress and less dependable. This can occur for the athlete when trying to learn a new technique such as striking a curve ball or trying to perform during the final seconds of a game that is on the line (e.g., shooting a free throw that may clinch a win). As the nondominant brain decreases its functioning, the dominant brain must learn to work virtually alone (Hannaford, 1997).

Table 2 shows all of the possible combinations of dominant inefficient patterns. Vision, hearing, written, and verbal communication and hand and foot movements are all limited as a result of these profiles. Visual limitations cause problems with perception. Auditory limited learners may tune out when people talk too much because the dominant brain hemisphere is not controlling the dominant ear. Communication limited learners see the whole image, but have trouble breaking down the pieces of language to communicate clear and concise ideas. Kinesthetically limited learners (hand movements) may be less able to express themselves with hand and body gestures, whereas movement limited learners (foot movements) have difficulty moving forward under stress and often appear clumsy and awkward in their movements (Hannaford, 1997).

Stress can also occur in the athletic environment when athletes find themselves in pressure situations where they play a critical role

Table 2

Dominant Inefficiency

Dominant Hemisphere	Dominant Sense	Learning Style	Other Examples
Right Brain	Right Eye	Visually Inefficient	Left Brain/Left Eye
Right Brain	Right Ear	Auditory Inefficient	Left Brain/Left Ear
Right Brain	Right Hand	Communication Inefficient	Left Brain/Left Hand
Right Brain	Right Foot	Movement Inefficient	Left Brain/Left Foot
Left Brain	Right Hand	Kinesthetically Inefficient	
Right Brain	Left Hand	Verbally Inefficient	

in the outcome. In such a survival/stress situation, the nondominant hemisphere of the brain shuts down its functioning by 75%–85% (Hannaford, 1997). Under stress, our functioning becomes lopsided, in that it may be either too logical (left brain) or too gestalt (right brain). The athlete may not see or hear as well, appear clumsy, or have trouble communicating. The dominant sense, opposite the dominant brain, determines how an athlete responds. During times of stress, an athlete who is left brain, right eye, left ear, right hand, and right foot dominant (mixed dominance profile) will be able to comprehend the situation, speak, and move efficiently, but will lack the ability to hear the details involved (dominant inefficient). An athlete with this profile playing guard in a basketball game in a pressure situation will be able to visually absorb the play illustrated by the coach, go out on the floor and move to where he or she needs to be, but may miss important auditory instructions given by the coach (left ear is on same side as dominant brain). Dominant preferences may provide an explanation for some confusing behaviors/outcomes in athletic performance and competition.

Theoretical Applications of Dominance Profiles to Coaching

Previous brain research centered on a functional understanding of the role of the brain with little practical application to the field of education or sport. We all take in, process, and apply information differently. Coaches need to develop an approach that caters to the diverse learning styles and dominance preferences of each individual athlete. Dominance profiles are a snapshot of the thought process, so athletes can utilize them to train and increase performance (Prashnig, 2004).

How can a coach use an understanding of dominance profiles and apply it to coaching athletes? Four theoretical recommendations on dominance profile use have evolved that are applicable to coaching sport:

1. knowing the strengths of each learning style by testing for dominance,
2. teaching the visual athlete,
3. teaching the auditory athlete, and
4. teaching the kinesthetic athlete.

Knowing the strengths of each learning style by testing for dominance. In the coaching/teaching environment, knowledge about how athletes take in information and learn is vital in helping athletes improve skills and knowledge about sport. Athletes use multiple ways to process information, and there is no better or best when it comes to one preferable way to learn. Typically, one learning mode is used more than the other, even though all of the learning modes may be called into play at some point. Evidence also exists that learning styles are specific to the task/skill that is being used, so knowing the athlete's preferences is imperative for a coach (Owens & Stewart, 2004).

To understand the learning styles of their athletes, coaches must first identify the dominant preferences of each individual. Once these preferences are acknowledged and understood, both the athlete and the coach can use the preferences to their advantage. Coaches can use this information to determine if the athlete's learning style matches the coaching style of the staff. This provides an advantage for the coaching staff to organize practices to accommodate the athlete's learning style.

Determining the preference for either right- or left-brain dominance is somewhat subjective and can be determined through self-assessment. Self-assessment is a valid approach to determine dominant preferences because the individual is aware of his or her learning strengths and weaknesses. Brain dominance is assessed by examining a list of characteristics that include both logic and gestalt dominant brain characteristics. The left hemisphere is known as the logic dominant hemisphere and deals mainly with details. These individuals like routines, files, sequences, details, and steps in A-B-C and 1-2-3 order. Left-brain dominants are very predictable and follow directions specifically and are very organized, note takers, list makers, and on time. They prefer to study in a formal setting (such as at a desk), with bright lights and limited distractions (Prashnig, 2004). The right hemisphere is known as the gestalt dominant hemisphere, and it deals with global or whole processing (the big picture). These individuals have no sense of time and prefer landmarks. The big picture often causes them to be emotional, but also produces good intuition. They are visionary and creative in developing grand ideas for projects and people, but have trouble developing the steps to accomplish the grand ideas. They can study anywhere (while watching TV, at a ball game), and interruptions do

not bother them. They are very spontaneous and often talk while using their hands. They problem solve out loud and are terrible with names, but great with faces and appearances. They guess with their checkbook and operate from piles, not files (Prashnig, 2004). Which hemisphere is your preference?

A preference for eye dominance is best determined with a partner. Partner A needs to make a triangle with his or her hands (arms stretched straight out) and look at partner B's nose from a distance of 5 feet. Partner B will look to see which eye he or she sees through the triangle. The eye that partner B sees is the dominant eye. Which eye is your preference?

Ear dominance is best determined by imagining which ear you would put up against a wall if there was a loud, juicy conversation in the next room that you wanted to hear. On which ear do you rest the phone most during long conversations? Which ear is your preference?

Shaking hands with a partner or handing a pencil to a person at navel level can determine hand dominance. With which hand do you reach? With which hand do you write?

Foot dominance involves the foot that you use to kick a ball. The foot with which you kick or the foot on which you step when thrown off balance can also determine foot dominance. Which foot is your preference?

Teaching the visual athlete. Research by Singer (1980) suggests that visual perception is the most important source of information in sports. Visual learners' primary source of information comes through the eyes from watching or seeing. A visual learner needs to see a move or a specific play demonstrated to pick up on the important perceptual cues (i.e., see the play or watch the defense). The coach can assist a tennis player that is learning the mechanics of the forehand in tennis by pointing out the visual cues that involve the grip, stance, swing and use of other body parts. Other visual aids to enhance learning include pictures, videos, charts, and diagrams.

If you have tested your athletes for dominance, then physical placement on the field/court can play a vital part in assisting with teaching and skill instruction (Figure 1). Knowing the eye dominance is also important for the athlete to take advantage of visual information in the environment. Visual learners need to be in the front of the learning environment (huddle, strategy session, etc.), so that they have a full visual field to take in and process

information. Left eye dominant individuals naturally scan from the right to the left and should be placed on the right side of the field/group for play or instruction. Right eye dominant individuals naturally scan from the left to the right and should be placed on the left side of the instructional area (Blaydes, 2000; Hannaford, 1997). Problems for the left eye dominant individual develop because a left eye dominant wants naturally to look first at the right side of the field/court and then move to the left. Coaches must realize this difference among athletes and determine situations, strategies, and plays that require tracking and movement.

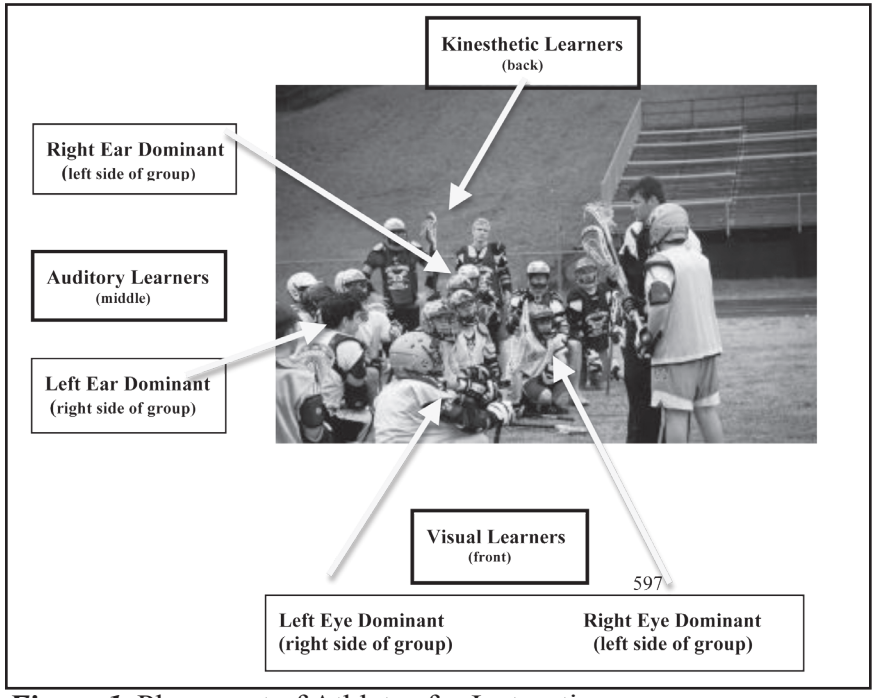

Figure 1. Placement of Athletes for Instruction

Our books and our school systems cater to right eye dominant learners, tracking from the left to the right, because natural eye movements occur from the right to the left. Placement for the visual learner in the athletic environment is important, so the athlete that is right eye dominant will have a full visual field to see the action that is taking place on the field/court (Blaydes & Hess, 2004; Hannaford, 1997). The coach's role is to provide the athlete with visual assistance as to the important stimuli that will aid the athlete in improving performance.

When practicing skills, students should practice with both the right and the left sides of the body. This enhances the neural pathways on both sides of the brain (Jenson, 2000). Athletes should be taught the difference between the dominant and nondominant hand and foot. Virtually every sport requires that an athlete be proficient in using each hand (basketball, volleyball, lacrosse) and in some cases each foot (soccer, rugby). Begin practicing new skills with the dominant hand/foot and then move to the nondominant side. When teaching skills, visual learners need to be able to form pictures in their minds about what the skill will look like. These athletes can easily relate to what is presented in a playbook, whereas athletes with other learning preferences, such as auditory learning, may not "get it." Provide the visual athletes with videos, pictures, charts, and demonstrations to effectively assist these learners.

Teaching the auditory athlete. An auditory learner needs to hear how a play is to take place to pick up the important auditory cues. The ears facilitate hearing, listening, and memory. If an athlete cannot hear the mechanics of the play, they may not be able to speak verbally about it or correctly read the play when it occurs. Knowing if the athlete is auditory efficient or limited may enable the coach and athlete to determine the most advantageous position for the player in the sport (Hannaford, 1997).

The athlete that learns best through auditory stimuli focuses on sounds and rhythms to improve performance (Coker, 1996). Auditory learners rely on language to learn, whether through lectures, team discussions, or taped messages. The auditory learner needs to have opportunities to talk out loud about a play and time to share thoughts with other players, repeat directions, and verbalize cues for the group. The auditory learner's preferences are enhanced when he or she hears himself or herself or others discuss each situation, which may be internalized into improved performance.

Auditory learners should be placed in the middle of the court/field for instruction behind visual learners. The ears facilitate hearing, listening, and memory. Sound is a regulator of movement. If a child cannot hear it, they cannot speak it or see it to read it. Left ear dominant individuals should be on the right side of the court/field and right ear dominant on the left side of the court/field. Placement for the auditory learners on a specific side of the court/field is important when skill instruction is given so that he or she will have a full auditory field to hear the instructions being given (Hannaford, 1997).

Auditory learners need to repeat directions and assist in verbalizing instructions to others on the team. Instead of using a playbook, these athletes need to talk through a play or sequence of skills. They will often ask you over and over again what play you want to run and need to hear it several times to internalize the information. Limit the amount of information given at one time (less to process) and be sure to reinforce cues for all skills by having your auditory learners repeat the cues or the information back to you.

Teaching the kinesthetic athlete. Kinesthetic learners need physically taken through or manipulated through the movement (Tobias, 1994). The information is processed and learned as the athlete has an opportunity to move. All athletes need to physically move through a new play or skill, but the kinesthetic athlete needs to know what the movement feels like. The correct feeling becomes the reference point to compare all other future movements (Coker, 1996). Replicating movements is the key for the kinesthetic learner, so repeated practice along with game simulations is important for this style. Because "perfect practice does not make perfect," the coaches responsibility is to reinforce and emphasize correct movements and to eliminate incorrect forms. Demonstrations need to be from all different angles so everyone can see the big picture and not some small part of it.

Kinesthetic learners need to move to learn a skill and should be in the back of the group for instruction. These athletes may need to physically mimic a specific technique, such as in the volleyball serve as the coach describes it to the team. Placement in the back of the group allows the athlete to learn without distracting others on the team or feeling self-conscious about their movements.

Demonstrations for the kinesthetic learner need to be from all different angles so athletes can see the big picture rather than some small part of it. Basic principles of motor development teach that different types of learners need to see every aspect of a play from every angle during practice (Magill, 2004). A point guard that runs the same play only down the left side of the lane during practice may lose control running the same play down the right side of the lane. Coaches need to realize that the same play run from different angles on the court/field is imperative for the athlete's success during the game. Coaches also need to remember that not every athlete is right hand dominant. Left-handed demonstrations are important to demonstrate and run. Coaches need to ensure athletes participate in

drills from every position rather than from their preferred spot each time.

On any team there will be a variety of athletes with various combinations of profiles. Coaches need to understand the strengths and weaknesses of each profile and use them in their instruction and practice each day. Failure to individualize the coaching/teaching preferences for athletes may deny them the opportunity to learn in the most efficient and effective manner and result in the team experiencing less success. By paying attention to the details of the athlete's primary preferences, coaches will increase the chances for the team and individuals to perform to their greatest potential (Owens & Stewart, 2004).

Conclusion

The information and research regarding dominance profiles at this time is limited, and much research needs conducted in the area of sports. The capacity to process information and learn skills varies from one athlete to the next, and dominance preferences may impact this process. These preferences are continually changing over time with increased maturity and development. The recommendations discussed above are intended to give coaches direction in one unexplored area of motor skill development. A coach's application of these principles can be combined with knowledge of motor development to continue to assist athletes in becoming their best.

Some athletes can execute under stressful "clutch" conditions and others choke. Could dominance preferences be an indicator in how an athlete will perform during stressful situations? Would appropriate placement on the field/court aid in visual observations or auditory dominance and perceptions? The answers to each of these questions can be examined in sport through the use of dominance profiles. The use of dominance profiles in the field of sports may provide coaches with a practical tool to assist in the learning and teaching process. Understanding your profile and that of the athlete may enable strengths and weaknesses to be addressed in a specific manner. The dominance profile is just one tool that may aid in the teaching of sport skills and that can provide a link to understand differences in learning and sport performance.

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