Hitting – A Matter of Perception
How eye dominance and visual recognition influence hitting success.

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Hitters spend countless hours honing their swing mechanics. It begins in the off-season with tee drills and soft toss. As the season approaches they progress to on-field batting practice and live BP with an actual pitcher on the mound. During the season, it is a continual process of early cage hitting and batting practice on the field. Yet, as coaches, we constantly see the same hitters repeat the same mistakes: opening up too quick in the swing, continuing to roll their wrists and pull ground balls on the outside pitch, failing to “load up” on time, or swinging at pitches out of the strike zone or in the dirt. What if these are not swing errors, but rather perceptual errors resulting from poor visual mechanics and misinformation?

Sports vision testing and training has emerged as the newest frontier in performance enhancement training. Although, the idea that enhancing one’s visual mechanics will improve their performance on the field has been researched for several decades. Worrell (15) illustrated that collegiate hitters who underwent specialized training could improve their batting average, slugging percentage, and on-base percentage by up to 47, 63, and 57 points respectively. This translates into a better understanding of the strike zone and more quality contacts.

Vision is best defined as the brain’s interpretation of the picture presented by the eyes. There are many components that combine to influence the relationship between the visual system and functional performance. These components include sensory parameters (acuity, stereopsis, peripheral awareness, eye dominance, contrast sensitivity), motor parameters (tracking, eye-hand coordination), and mental processing parameters (visual search and recognition). A hitter that faces a 90mph fastball has 0.4 seconds to see the ball, decide to swing, and then initiate the swing (8). Miller and Low (9) determined that differences in reaction time are due to mental processing time. Therefore, the more efficient the player’s visual input and information processing, then the more efficient his swing and contact will be. The purpose of this article is to outline how two key visual parameters can be used to simplify and improve the in-game thought process: Eye Dominance and Visual Search and Recognition.
**EYE DOMINANCE**

The dominant or referential eye is the one which is sighted towards a target. Individuals are classified as either “Same Side Dominant” or “Crossed Dominant”. Same Side Dominant for example is an individual who is right eye and right hand dominant. Crossed Dominant refers to those who are right eye and left hand dominant. However, whether a hitter is Same Side Dominant or Crossed Dominant has no effect on his batting average (1,2,7).

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<th>Same Side Dominance</th>
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<td>Major League Hitters Batting Avg.</td>
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Table 1. Laby et al. 1998

The primary advantage to the dominant eye is that it processes information approximately 14-21 milliseconds faster than the non-dominant eye. It has priority in visual processing and can even perhaps inhibit the non-dominant eye’s representations (3,12,13). Let’s review the hitting timeline. A 90mph fastball takes 400 milliseconds to reach home plate. According to Laming (8), recognition reaction times can average 384 milliseconds leaving only a margin for error of 16 milliseconds. Therefore, optimizing the use of the dominant eye and its increased processing speed becomes significantly more important.

Optimizing the use of the dominant eye involves placing it in a position to gain a greater field of vision. This can be done by simply turning or straightening the head or adjusting the player’s batting stance in order to place the dominant eye in a better position. Figure 1 illustrates a neutral stance with the hitter’s head and eyes turned to completely face the pitcher (left), a slightly opened stance (middle), and an extremely opened stance (right). The neutral stance is best suited for the Crossed Dominant hitter. While the open stance variations are more appropriate for the Same Side Dominant athlete. No attempts should be made to change a player’s eye-hand dominance. Historically, this has resulted in physical or psychological damage to the athlete (10).
VISUAL SEARCH AND RECOGNITION

A baseball pitch travels at approximately 1000 degrees per second. The fastest the eyes can physiologically track a ball is approximately 90 degrees per second (4). Given this large difference, hitters must rely on efficient visual search and recognition to pick out the relevant and important clues (i.e. the type of pitch, spin, speed, and trajectory). Research using hockey goal keepers indicates that the most essential visual information is contained in the time just after the shooter’s stick has contacted the puck (6). Baseball hitters therefore, should benefit from focusing their gaze to the pitcher’s release.

DETERMINING EYE DOMINANCE:

The athlete holds his/her arms and hands extended forward with palms away. Bring the hands together to form a hole with your thumbs and edge of hands. Look at an object at a distance of 20 yards and raise hands so that the object is visible through the hole. Now close one eye and then the other. The eye that sees the object is the dominant eye. If the object is seen with both eyes, then make the hole smaller.
point during his delivery of the ball. In fact, several studies have noted that expert hitters use visual search strategies to identify specific cues resulting in more accurate and quicker decision making (11, 14). Hitters should typically begin with a “soft focus” of the pitcher’s body, such as the head, chest, or trunk. A “soft focus” refers to a relaxed gaze which is not attempting to pick out any details regarding the field of view. As the pitcher progresses through his wind-up, the hitter should shift his attention and “hard focus” (fine tuned gaze attempting to distinguish specific details of the visual field) on the pitching arm and release point just before and following the release of the ball (5, 14). This process of “soft focus” to “hard focus” prevents eye strain and fatigue and allows for better processing of important information.

As mentioned, the traditional gaze pattern seems to be a direction leading from the pitcher’s body to his hand and release point. Given that approximately 90 percent of the adult population is right-handed, this means that hitters generally search in a right-to-left direction. It may be possible that, just as individuals have a dominant eye, they may as well have a dominant search pattern. For example, what if a batter is able to search 0.05 seconds faster in a left-to-right pattern? For starters, that may explain why some individual hitters seem to perform well against left-handed pitchers. Identifying a hitter’s dominant search pattern could be useful in order to modify his focus regions teach him how to more quickly and accurately identify important information. More research needs to be performed in this area.

CONCLUSION

Identifying and taking advantage of eye dominance and visual search strategies can translate into a variety of athletic skills needed for peak performance such as increased reaction time, eye-hand coordination, balance, and timing. This can result in a more honed and fine-tuned sport-specific skill – hitting a baseball.
FLASH THROW DRILL:

Procedure:

A pitcher goes through his motion at regular speed but does not throw a ball. Instead, he holds up one, two, three, or no fingers. The hitter attempts to call out the number of fingers that the pitcher held up. Slow down the arm speed until the hitter is able to see the fingers. Then adjust to increase the intensity level as able.

Gradations:

a. Each number represents a pitch. For example: “2” = fastball; “3” = change-up; “1” = curveball. The hitter must process and call out the correct pitch type.

b. The hitter stands at a tee and performs a swing response to the pitch type. For example, if the pitch is a fastball (”2”), then he swings immediately. If the pitch is an off-speed pitch (”1” curveball or “3” change-up), the hitter strides, delays his swing a beat, then swings at the ball on the tee.

Duration: Repeat for 2 – 3 sets of 20 repetitions
REFERENCES


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