When watching a baseball player hit, it is clear that vision is a dominant sensory system. The visual skills of a baseball player go beyond static visual acuity (ability to see clearly in a non-moving position while looking at a non-moving object); hitters must use their vision dynamically. These dynamic visual skills include stereo acuity (depth perception), visual attention, eye movements, dynamic visual acuity (ability to identify objects moving horizontally or vertically at specific velocities), contrast sensitivity (being able to pick a target out of a background), kinetic visual acuity (ability to identify approaching objects at specific velocities), choice reaction time, peripheral vision, recognition time, visual direction, and anticipation (7,9,10,11). Researchers have determined that baseball players have better dynamic visual acuity, stereo acuity, and contrast sensitivity than those who do not play baseball (10,16).

Because most professional baseball players have excellent vision, it is thought that if one could improve a player’s visual skills with sports vision training, one might be able to enhance offensive baseball performance (10). In general, there is an agreement that vision training is beneficial to baseball players, but objective and quantifiable assessment validating the training to enhance baseball performance is relatively lacking in the literature and remains controversial due to research design factors (1,6,8,10,15,16). The purpose of this article is to briefly discuss the relationship between vision scores and training relative to batting performance.

RELATIONSHIP BETWEEN VISION SCORES AND OFFENSIVE PERFORMANCE

Four baseball studies have examined the relationship between vision scores and baseball batting performance (4,11,13,14). In 1997, Classe et al. investigated the relationship between vision reaction time (VRT) and batting, fielding, and pitching skill in baseball (4). A vision screening of 213 professional baseball players was performed and the visual reaction times of these players were determined. Official statistics (batting average, fielding average, and earned run average) from the Southern Baseball League were compared to VRT scores. For the 92 players who batted at least 100 times, there was a positive association found between VRT and batting average (BA) (4).

In 2011, Reichow et al. conducted a pilot study that assessed the potential of the tachistoscope, which measures visual recognition time, to determine the ability of 20 collegiate baseball players to identify the type of pitch illustrated in 30 randomly ordered slides showing a pitcher throwing four different baseball pitches (11). For this study, each slide was presented for 0.2 s. The results of the test were compared with the athlete’s BA during the previous season. A positive correlation was found between an athlete’s ability to correctly identify a picture of a pitch presented tachistoscopically and BA. The authors suggested that a superior ability to recognize pitches might relate to a higher skill level in batting.
In 2014, Spaniol et al. reported the relationship between visual skills and batting performance of 352 professional baseball players during the 2013 minor league baseball season (13). Visual skills were assessed using Vizual Edge, which is a computerized software program to assess baseball players.

In 2015, Szymanski et al. compared vision performance scores (VPS) before and after 10 weeks of vision training to offensive statistics of nine collegiate baseball hitters with a minimum of 100 at bats (14). Hitters completed vision training three times per week (10 – 15 min per session) for 10 weeks using the Vizual Edge computerized software system. Vision testing and training consisted of vision performance variables, such as vision score, eye alignment, depth perception, visual flexibility, visual recognition, and visual tracking. Pre- and post-training VPS were compared to the offensive statistics of BA, hits, doubles, triples, home runs (HR), runs batted in (RBI), SLG, OB%, base on balls (BB), and strike outs (SO). There was a significant high positive correlation between post-visual recognition and hits, whereas a significant high negative correlation between post-depth perception and SO was found. There were significant positive correlations between post-visual tracking and triples and BB, as well as post-convergence % and BB and OB%. Whereas, significant moderately high negative correlations between post-eye alignment and BB, as well as post-vision score and SO, were found. Collegiate hitters with greater VPS in six of the 11 categories had better offensive statistics. However, those with greater VPS did not have a greater BA or collect more HR or RBI. Therefore, the authors stated that players that have excellent hitting mechanics and possess greater VPS might have the best opportunity to be successful offensively.

**VISION TRAINING AND OFFENSIVE BATTING PERFORMANCE**

Five baseball studies have examined the effects of vision training on batting performance (2,3,5,7,12). In 2005, Bowen and Horth examined the effect of EYEPORT, a vision training system that uses automated colored lights, on the hitting performance of 12 little league baseball players after training 10 min per day, six days per week, for three weeks (2). Before and after the vision training sessions, each player was given a series of 40 curveball pitches fed from a pitching machine at 50 mph. The mean number of successful hits, before and after using the system, was compared. Significant improvement in the total number of hits was demonstrated. The mean number of hits before and after using the EYEPORT vision training system was 17 and 28, respectively. Hits plus foul balls were also evaluated. The mean number of hits plus foul balls before and after training was 24 and 32, respectively, and the players showed a 34% improvement in hits plus foul balls. According to the authors, these results support the premise that the vision training system improved batting performance in little league baseball players. However, since there was no control group that attempted to hit curveballs without vision training, it is not clear as to whether there was simply a learning effect from attempting to hit and see curveballs six times per week for three weeks.

In 2007, Honda et al. examined the effect of bunt training using monocular vision (eye mask covering one eye) on kinetic and dynamic visual acuity and bunt performance in 34 collegiate baseball players (7). The training (fielders) group (n = 27) performed special bunt training using monocular vision three times per week for seven weeks. The pitcher group (n = 7) did not engage in any bunt training. Static, kinetic, and dynamic visual acuity and bunt performance were measured at pre- and post-training. Kinetic visual acuity and bunt performance increased significantly for the training group. However, there was no significant difference of dynamic visual acuity between pre- and post-training in the training group. The pitcher group, as expected, had no improvements. The authors suggested that the training methods utilized in this study improved the kinetic visual acuity and bunting performance; however, the pitcher group did not perform any bunting training whatsoever. If they would have bunted for seven weeks while watching the ball with both eyes, they might have made improvements after practicing. Finally, the authors did caution this form of training because it could be dangerous for children and novice baseball players since one eye was covered while bunting.

In 2008, Spaniol et al. evaluated whether Vizual Edge computerized vision training had an effect on the batting skills of 18 collegiate baseball players that were divided into two equal groups (12). No structured team batting practice took place during the study. Each subject was tested for visual skills to determine eye alignment, eye flexibility, visual recognition, visual memory, and visual tracking. A composite score was also calculated for each subject, which was used to establish personalized vision training protocols. Batting performance was determined by measuring batted ball velocity (BBV) in miles per hour (mph) during two rounds of six swings with balls delivered from a pitching machine. The treatment group received computerized vision training three times per week for five weeks (10 – 15 min per session). Results showed a statistically significant difference between the BBV of the treatment group (52.6 ± 19.6 mph) and
Consideration of Sports Vision Training for Baseball Hitters

Previous baseball research indicates that better visual skills relate to offensive batting performance, but correlations do not equal a cause and effect relationship (4,11,13,14). Therefore, it is important to evaluate baseball studies that have investigated vision training and offensive batting performance to see if vision training improves offensive statistics. However, research design factors such as no control group, control groups where pitchers did not practice bunting, inappropriate comparisons, multiple types of vision training implemented in one study, and small sample sizes are all limitations that weaken the results and conclusions, indicating the need for further studies on vision training and its effect on offensive performance in baseball. Conversely, improvements in PR and BBV were seen in the two fairly well designed studies conducted by Gilliam and Spaniol, both of which used the Vizual Edge training system.

Hitting a pitched baseball requires many skills; however, a hitter cannot hit what they cannot see. Players at higher levels typically have better visual function and can identify the release point, location, movement, and rotation of the ball better than players at lower levels or non-athletes (8,10,16). It makes sense that improvements to a player’s vision could lead to improvements in their batting performance, but there also needs to be more controlled studies with strong research designs to evaluate performance variables that may not simply be offensive statistics.

REFERENCES


ABOUT THE AUTHOR

David Szymanski is a Professor in the Department of Kinesiology, Associate Department Chair, and Coordinator of Graduate Program at Louisiana Tech University. He holds the Eva Cunningham Endowed Professorship in Education. He is a Certified Strength and Conditioning Coach® with Distinction (CSCS,*D*), Registered Strength and Conditioning Coach Emeritus (RSCC*E), a Fellow, and current Board of Director member of the National Strength and Conditioning Association (NSCA). He is an Associate Editor for the *Journal of Strength Conditioning Research* and the *Strength and Conditioning Journal*. His primary research has focused on ways to improve baseball and softball performance. He formerly was the Head Strength and Conditioning Coach for the Louisiana Tech University baseball team for 10 years.