

To keep their eye on the ball, batters mostly use their heads

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Baseball players at bat follow coaches' advice to "keep your eye on the ball"—but head movements play a surprisingly important role in tracking pitches, suggests a study in *Optometry and Vision Science*, official journal of the American Academy of Optometry.

The findings lend new insights into how batters accomplish the complex task of tracking a pitched ball—and might even lead to new strategies designed to improve their ability to see pitches, according to the study by Nicklaus F. Fogt, OD, PhD, FAAO, and Aaron B., Zimmerman, OD, MS, FAAO, of The Ohio State University College of Optometry.

Here Comes the Pitch—Where Are the Batter's Eyes?

Drs Fogt and Zimmerman designed an experimental setup to monitor eye and head tracking movements in a group of 15 Division I collegiate [baseball players](#). The players tracked, but did not swing at, a large number of balls pitched by a pneumatic pitching machine. Eye and head movements were synchronized with trajectory of the pitches.

"On average, eye gaze position matched the target position well throughout the trajectory," according to the researchers. But most of the time the ball was in the air, the players tracked it with their head—they moved their eyes very little until late in the pitch trajectory.

The pitches took about 400 milliseconds (ie, four-tenths) of a second to

complete their trajectory; the players did not move their eyes until between 340 and 380 milliseconds. Although head movements varied between players, they seemed to follow a common strategy of "neural coupling" between eye and head movements.

Experiments included a task in which players were to call out colors (red or black) and numbers written on the pitched balls. However, their performance in calling out the correct colors and numbers was not significantly better than chance. Surprisingly, the players' static visual acuity (as measured on an eye chart) averaged slightly less than normal.

Possible Implications for Vision Training in Baseball Players

The findings are consistent with a previous study of pitch tracking in a Major League Baseball player. But they contrast with studies of fielders, who primarily track fly balls to the point where it will land, but move both their eyes and head when attempting to catch the ball.

"Hitting a baseball is a remarkably difficult task," Drs Fogt and Zimmerman write. For a pitch traveling 90 miles per hour, the batter has only about one-fourth of a second to decide "when and at what location the ball will arrive and whether to swing the bat." The new study was designed to assess the eye and head movement strategies used in tracking pitched balls, and whether they were consistent between players.

In the new study, "Division I college baseline players applied a strategy in which the eye was moved very little with any correctional [eye](#) movements until late in the pitch trajectory while the head was aimed at the ball," according to the authors. They add, "It will be interesting in the future to compare tracking strategies to hitting success, and tracking strategies of elite players to those of novice players."

It's unknown whether vision training can lead to improved on-field performance—although Drs Fogt and Zimmerman note that one collegiate baseball team reported a large increase in batting average after incorporating a vision training regimen into their practice. The researchers conclude, "By better identifying the physiologic capabilities and gaze behaviors of baseball players, it may become possible to develop more precise [vision training](#) strategies for players of all calibers."

Provided by Wolters Kluwer Health

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