

# How long do batters 'keep their eye on the ball'? Eye and head movements differ when swinging or taking a pitch

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Where are baseball batters looking during the fraction of a second when a pitched ball is in their air? Their visual tracking strategies differ

depending on whether they're swinging at the pitch, reports a study in the August issue of *Optometry and Vision Science*, the official journal of the American Academy of Optometry.

Patterns of head and [eye movements](#) are subtly different when batters are swinging versus "taking" a pitch, according to the new research by Nick Fogt, OD, PhD, FAAO, and Tyler W. Persson, OD, MS, FAAO, of The Ohio State University College of Optometry, Columbus. The study adds new information that batters "keep their eye on the ball" longer when they're swinging versus not swinging.

## **New Insights into Batters' 'Tracking Strategies' at the Plate**

The researchers measured horizontal eye and head movements in two collegiate baseball players, who were facing balls thrown by a pitching machine. During one series of pitches, the hitters were instructed not to swing at the pitch. During the next series, they tried to hit the pitched balls.

Head movements were tracked using an inertial sensor mounted on the players' helmets; eye movements were measured using a video eye tracker. Drs. Fogt and Persson examined whether there were any differences in head and eye movements when batters were swinging or "taking" the pitch.

Under both conditions, the two batters followed a similar visual strategy. When not swinging, they mainly moved their heads toward the ball—not their eyes—for most of the time the pitch was in the air. But about 150 milliseconds before the ball arrived, the batters shifted their gaze ahead of the ball—near the point where it crossed the plate. "Large eye movements only occurred late in the pitch trajectory," the researchers

write.

But when swinging, the batters followed a different visual strategy. Throughout the pitch trajectory, head movements toward the ball were substantially larger than eye movements. The batters "kept their eye on the ball" as long as possible: until about 50 milliseconds before it crossed the plate.

Why the difference in visual tracking strategy when swinging versus not swinging? When "taking" a pitch, watching where the ball crosses the plate may provide useful information for swinging at future pitches.

In contrast, when swinging at the pitch, maintaining gaze on the ball may "enhance predictions of when and where the ball will arrive." This strategy might also allow more time for "foveation," or fixing on features of the ball such as seam rotation.

"On the other hand...it could be that batters maintain gaze on the ball simply because they have been coached to 'keep their eye on the ball,'" Drs. Fogt and Persson add. They believe their study supports previous research suggesting that placing the gaze ahead of the ball is the "optimal learning strategy," while tracking the [ball](#) is the "optimal hitting strategy."

The findings build on a previous study, in which Dr. Fogt and colleagues found that batters use mainly [head](#) movements, rather than eye movements, to track pitched balls. Further studies will be needed to see if similar visual strategies are followed by batters at higher levels of competition—and in game conditions where [pitch](#) trajectories are less predictable.

**More information:** Nick Fogt et al. A Pilot Study of Horizontal Head and Eye Rotations in Baseball Batting, *Optometry and Vision Science*

(2017). [DOI: 10.1097/OPX.0000000000001100](https://doi.org/10.1097/OPX.0000000000001100)

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