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There’s More Than Meets The Eye To Catching A Fly Ball In The Outfield

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DURHAM, N.H. -- It looks so simple – catching a fly ball. But of all of the balls hit into the outfield, the straight shot is the most difficult to catch. And if it’s twilight, it’s even worse.

Ken Fuld, professor of psychology at the University of New Hampshire, studies visual psychophysics. A former assistant baseball coach at UNH with a son playing for one of the Chicago Cubs minor league teams, Fuld says there’s more than meets the eye to catching fly balls and hitting pitches for the boys of summer.

“An outfielder is computing a collision course between the ball and the fielder in much the same way as a bird of prey tries to intercept another bird also in flight for its meal or an insect tries to contact a member of the opposite sex for the purpose of mating. These are all forms of what vision scientists call visually guided behavior. Fielders must figure out the trajectory of the ball and combine that with information about their own movement in a way that requires a quick initial calculation of this information and then constant updating of information to correct for slight errors,” Fuld says.

Of all the balls hit into the outfield, those hit directly to a fielder are the most difficult to catch. As Fuld explains, there is less visual information available to the fielder on a straight shot when making these unconscious visual computations.

“Good fielders do not run to a place where the ball will land and then wait for it, but rather catch the ball while running. This is contrary to what many coaches prescribe, which is to ‘get under a ball and not drift on it,’ he says. “Without a side view of a ball, a fielder has mostly only information about angular velocity (rate of optical expansion of ball as it approaches) with little information on linear velocity.”

Fielders playing under high-quality artificial lighting at night have an easier time catching fly balls than those playing on a sunny day, since there are fewer, if any, shadows, and less glare.

“The worst time of day, as any ball player will tell you, is twilight,” Fuld says.

For batters, the four-seam fastball is the easiest pitch to hit. Even though fastballs reach speeds of 100 mph, Fuld explains that a fastball has the straightest trajectory. On the other hand, the curve ball with a good downward motion (the so-called 12-to-6 curve, like a clock), the forkball, and the split-fingered fastball are more difficult to hit, the latter of the three being the most difficult, Fuld says.

“The spin on the other balls have unique signatures, whereas the spin of a split-fingered fastball looks like that of a regular fastball, but the ball is slightly off-speed and has that
downward trajectory,” he says.

Good hitters track a pitched ball for a longer period than do non-accomplished hitters, but none can “keep their eye on the ball” for the entire length of a pitch, Fulds says – it’s physiologically impossible. “Good hitters fixate on a pitcher's release point and then make an eye movement (called a saccade) to begin tracking the ball (called a smooth pursuit eye movement) for as long as possible. A good hitter can track the ball to within about five feet; a not-so-good hitter loses eye contact at about 10 feet,” he says.

And if you ever wonder why a good hitter lets a perfectly good pitch go by without swinging, he may be trying to calibrate its track.

“The batter purposely leaves eye contact mid-way through a pitch and makes an anticipatory saccade to the point just in front of where the ball crosses the plate. If the ball seems to rise (which it physically can't if it was thrown overhand), it is traveling faster than the batter initially thought, but now the batter has calibrated it. The batter now has an advantage if the pitcher throws the same type of pitch next time, but as someone once said, ‘good hitting is timing; good pitching is upsetting this timing,’ ” Fulds says.

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