THE GYROBALL MYSTERY

December 20, 2006

The Boston Red Sox have signed star Japanese pitcher Daisuke "Dice-K" Matsuzaka to a six-year, $100 million contract, with many fans hoping he will throw the fabled "gyroball," possibly the first new pitch since 1976.

Officially, Matsuzaka commands an impressive repertoire of pitches: a fastball, curveball, slider, changeup, split-finger fastball and cut fastball -- most pitchers have just mastered two or three.

But it's another of his pitches that has the attention of fans: the gyroball, a pitch thrown like a football that could have a mesmerizing horizontal movement or could be baseball's Bigfoot.

If Matsuzaka throws the gyroball next season -- he told Yahoo! Sports coyly he has thrown it, but "not too much, sometimes accidentally" -- it would be the first new pitch to reach the big leagues since Hall of Famer Bruce Sutter's split-finger fastball in 1976.

It would also be the first pitch in Major League Baseball developed not on the pitcher's mound but in the laboratory.

Inventing the gyroball

About six years ago, Japanese computer scientist Ryutaro Himeno created the gyroball in computer simulations that modeled airflow around spinning baseballs. He then shared his research with baseball training manager Kazushi Tezuka.

All airborne baseballs have three forces acting on them: gravity, which pulls the ball down; air resistance, which slows the ball; and lift, which can nudge the ball up, down, left or right, depending on the spin on the ball.

Most pitchers manipulate the lift force as they throw the ball.

A fastball, thrown primarily with backspin, appears to rise. A curveball, thrown with topspin, sinks more than it would with just gravity. A slider, thrown with sidespin, on a second axis, moves or "breaks" horizontally.

Himeno's pitch creates a primary spin along a third axis. From a batter's perspective, the ball spins clockwise or counterclockwise like a football.

"I've never seen a slider like this," said Will Carroll, a sports columnist at Baseball Prospectus who examined pictures in one of Himeno's books describing the biomechanics of the gyroball.

Carroll says the pitch breaks late and sideways between 1.5 and 2 feet making it extremely difficult to hit.

"I've given up trying to convince people it's real. Now I'm just going to show them."

Learning to throw the gyroball

"You're throwing the ball like a football. Your hand is out on the side of it, much like you would see a quarterback," Carroll explains.

"For a right-handed pitcher, the back of his hand is toward third base at release. And instead of putting spin over the top like a curveball, or backspin like a fastball, you're going to make it go sideways like a spiral."

Carroll recently taught the pitch to 23-year-old financial consultant and amateur league player Kyle Boddy.

Boddy is far from mastering the pitch, but said, "It's not a miracle pitch; at the end of the day, it's another changeup pitch."

Boddy says his gyroball has a downward break of about a foot, and a sideways break of about 4 inches -- but only because he throws the pitch at an angle and about 10 mph slower than his fastball, allowing it more time to break.

Theoretical movement of gyroballs

Boddy's results are close to those predicted by baseball physicists.

"It's easy to be fooled. ... I would trust people if they said the pitch is breaking to the side one way or the other, but how do you know that the pitch is a gyroball?" said Alan Nathan, a physics professor at the University of Illinois at Urbana-Champaign who has gone as far as any American scientist in demystifying the motion of the gyroball.

Though he has yet to see the pitch thrown, Nathan predicts the sideways break should theoretically be much smaller than the slider.

When a "perfect" gyroball is thrown with spiral spin -- and no topspin, backspin or sidespin -- Nathan argues that only two of the three forces, gravity and air resistance, should affect the ball's trajectory. The third force, lift, should cancel itself out.

"So how does the ball know whether to break to the left or to the right? It doesn't," he said.

Nathan contends that the perfect gyroball should look not like a slider but like the knuckleball, another spin-free pitch.

The knuckleball takes an unpredictable flight path because asymmetric air resistance forces, caused by the baseball's raised stitching, can push the ball in almost any direction.

Nathan is similarly unsure what role the stitching could play in the case of the gyroball.

Planning gyroball research

Nathan and his colleagues hope to have a better understanding of what a gyroball could do in early 2007, when he hopes to have studied the gyroball with high-speed cameras.

"It's just a matter of time till we have one of the gyroball pitchers in my lab," said American Sports Medicine Institute research director Glenn Fleisig, who works with major league teams -- including Matsuzaka's Boston Red Sox.

But what does he think about Matsuzaka's gyroball?

"I'm looking forward to seeing one," Fleisig said.

-- *By Adnaan Wasey, NewsHour Extra*