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Sports jocks are oh-so predictable

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A clever athlete knows how to keep an opponent guessing, but professionals act more predictably than they should. So says a study based on game theory, which shows that [baseball pitchers](#) throw too many fastballs and [American football](#) teams don't pass the ball enough. The finding could give savvy teams an extra victory or two over the course of a season.

The game theory concept of "minimax" says that players in a head-to-head match should follow two basic rules: first, play in a way that minimises your opponent's possible gain; second, be unpredictable.



Another fast ball... how predictable (Image: Rex Features)

Lab trials have shown that [humans seldom play games according to these simple rules](#). This might be because the players were not playing for meaningful stakes, however, and [did not have a detailed working knowledge of the game \(PDF\)](#). In other words, they were amateurs, not professionals.

Studies of sports professionals at work – such as [tennis players serving the ball \(PDF\)](#) and [soccer players taking penalty kicks \(PDF\)](#) – have shown that skilled individuals in high-stakes situations may indeed play the ideal minimax strategy. These study groups were small, however, without the statistical power to allow conclusions to be drawn with certainty.

Fastballs bat better

To get a better sense of whether professional athletes play as game theory recommends, [Steven Levitt](#) of the University of Chicago – co-author of the bestseller *Freakonomics* – and [Ken Kovash](#) of open-source software organisation Mozilla looked at two large sets of baseball and American football statistics.

They first analysed over 3 million pitches thrown in major-league baseball games between 2002 and 2006. For each type of pitch, they measured the batter's "OPS" – a number that represents how likely a batter is to reach a base or to make a big hit. They found, on average, that fastballs tended to give batters 20 per cent higher OPS than [curveballs](#).

If pitchers played according to minimax, the OPS for curveballs and fastballs should be the same, but in fact pitchers gave batters a slight edge by throwing too many fastballs.

Levitt and Kovash then looked at whether or not pitchers chose their pitches as unpredictably as minimax theory says they should. They found that when a pitcher threw a fastball, his next pitch was 4 per cent less likely to be a fastball as well. If pitchers played truly rationally, there would be no such bias towards switching the type of pitch. "Pitchers are being just a little too cute on the mound when they're switching back and forth so often," says Kovash.

Onto the gridiron

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The authors then turned their attention to American football, analysing 125,000 plays from the 2001 to 2005 seasons. They boiled down each play to the decision either to run the ball on the ground or to pass it through the air, and looked at the decision's payoff in terms both of field position and of yards gained.

As with the baseball analysis, Levitt and Kovash found that one option – running – tended to have worse results than the other, but was used more often than it should be. They also found that, like pitchers, teams were slightly predictable in that after a run, the next play was more likely to be a pass.

What about intangibles?

John Wooders of the University of Arizona in Tucson calls the finding "interesting" but questions whether it is a true test of the minimax theory. In particular, he points to the way that Levitt and Kovash measure the payoffs for each sport. "The objective of a team is to win the game," he says. "At the end of the day, they don't care if they win by five points or 10 points," he continues.

Wooders, who was not involved with the study, has concerns that using OPS as a measure of a batter's payoff doesn't adequately capture his contribution to his team's win or loss. "There are a lot of ways that a player can help his team that don't show up in numbers," says Wooders.

Levitt and Kovash talked to major-league baseball executives to estimate the effect of a batter's OPS on the overall team performance. They concluded that if pitchers threw fewer fastballs, they could save their team between 10 to 15 runs per year. Likewise, if batters exploited pitchers' slight predictability, they would gain 10 to 15 runs a year. The authors estimate that this would translate into up to two extra victories per year.

In the case of football, the authors claim that the team that exploits its opponent's tendencies to run too much and switch plays too often could earn up to 10 extra points per season, or half a win per year.

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