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DAVID DOBBS ON SCIENCE, NATURE, AND CULTURE.

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Curveball deception & Koufax as god, cont'd

Posted on: May 19, 2009 7:36 PM, by **David Dobbs**

Found some Koufax footage. About halfway through this short clip he Ks Mantle, looking, and a bit later, in the dark footage toward the end, is a good strip of him throwing the devastating curve. Note there the emphatic downward motion of his shoulder -- which brought down his hand the faster, which (along with big, flexible hands and fingers) helped him make the ball spin 15 times on the way to the plate instead of the MLB-standard 12-13.

Following up my curveball coverage of last week, faithful reader and Cognitive Daily maestro Dave Munger wrote in noting that Arthur Shapiro, one of the authors of the curveball-explaining Illusion of the Year (and a friend of Munger's) posted a fuller explanation of the illusion and effect at his website, Illusion Sciences. As in the prior post, I'm not putting the illusion here because a) that way you'll have to see it there and b) I don't know how to move the illusion here anyway; I try, and my eyes hurt (a visual illusionist's DRW, I suspect). But I past in here an elided version of Shapiro's the fuller explanation. I love the dryness of the first couple sentences.

NB: Koufax-as-god bonuses for those who read (or skip) to the end of Shapiro's excerpt.

> In the game of baseball, a pitcher stands on a mound and throws a 2.9-inch diameter ball in the direction of home plate. The pitcher creates different types of pitches by releasing the ball at different velocities and with different spins. A typical major league "curveball" travels at about 75 mph, and spins at an oblique angle at about 1500 rpm; this means that the travel time from the pitcher's hand to home plate is about 0.6 sec, during which time the ball undergoes about 13 rotations.
>
> The spinning of the curveball creates both a physical effect ("the curve") and a perceptual puzzle. The curve arises because the balls' rotation creates an imbalance of forces on different sides of the ball, which leads to a substantial deflection in the path of the ball. The perceptual puzzle arises because the deflection of the ball should appear curved, but nothing that Arthur Shapiro, one of the batter standing near home plate, the flight of the ball often appears to undergo a dramatic and nearly discontinuous shift in position (this sudden shift is referred to as the curveball's "break").
>
> Here we present an illusion that suggests that the perception of a "break" in the curveball's path may be related to physiological differences between foveal and peripheral vision. We contend that the visual periphery frequently reports a perceptual combination of features (a process we refer to as "feature blur") because it lacks the neural machinery necessary to maintain separate representations of multiple features.
>
> ...
>
> Illusion 2: The curveball
>
> The curveball illusion consists of a single oval that drifts from the top of the screen to the bottom. The oval contains an internal grating that drifts from right to left. The illusion is analogous to a real curveball because the motion of the global object (i.e., a ball) is independent of the internal motion (i.e., a spin).
>
> 1. When the observer tracks the oval foveally, the motion will follow the oval (i.e., the oval appears to descend vertically).
>
> 2. When the observer fixates to the right of the screen so that the oval falls in the far periphery, the oval appears to drift down the screen at an oblique angle.
>
> 3. When the observer initially fixates to the right of the screen (i.e., viewing the oval in the peripheral field) and then shifts to the oval's descent, shifts his/her gaze to look directly at the oval (so that the oval is in the fovea), the flight of the oval "snaps" suddenly from an oblique to a vertical descent.
>
> **The dramatic shift in direction seen in step 3 of Illusion 2 is analogous to the "break" of the curveball. From a batter's point of view, the ball in the pitcher's hand has a visual angle of 0.23 deg; and the ball, when two feet away from home plate, has a visual angle of 0.89 deg. Even if the batter can fixate on the center of the ball, the general belief in the batter's image that falls outside the fovea increases over the course of the ball's flight. If the batter shifts eye position during the pitch, then the change from fovea to periphery (or vice versa) will be even more dramatic. The perceptual jump (step 3 of Illusion 2) is interesting because humans spend a great deal of time shifting their eyes to move objects from the periphery to the fovea; we are likely to encounter apparent changes in speed and even the trajectory of moving objects on a regular basis.**

No wonder Mantle said what he said.

OK. The bonuses. You get several. Best is last, I promise

1. **Here's an NPR story** that includes a podcast with highlights from Vin Scully calling the first of Koufax's no-hitters, on June 20, 1962. Emerged in a good Sawyer segment in 1990.

2. A **Koufax story I read a few years back**, either in Leary's bio of him or perhaps an Angell piece. Koufax, retired almost 20 years and in his 40s, was pitching BP to the Dodgers (whom he often helped coach) between post-season series in the mid-1980s. This was the great-hitting Dodger line-up with Sax, Garvey, Baker, Cey, and others. Just throwing easy minor-league 45-year-old man fastballs for BP, batting in the cage with them. Saying one of the hitters calls for the famous curveball. This Koufax usually didn't throw, lest it aggravate his elbow. But this hitter wanted to see the thing, see if he could hit it, so Koufax indulged him.

This is a major league hitter who knows what pitch is coming, batting against a man in his mid-40s.

Curve comes in, drops like a stone -- a swing and a miss.

Hitter calls for another. Same result. Several more; the same.

By now the hitter's teammates are in hysterics. He gives up, walks off, tells his buddies, you try it, then. And one by one they do -- this great Dodger line-up comes up, every one knowing what pitch he's getting, and *no one can connect*. Koufax is 45 or so -- and with one pitch, pre-announced, he is unhittable.

No wonder Mantle said what he said.

As the story goes, manager LaSorda walked out to the mound and, using the pretext he wanted to protect Koufax's arm, asked him to stop -- but to Koufax he said, Cut it out already, I don't want my hitters mentally destroyed just before a post-season series because they can't hit a one-pitch man in his 40s.

3. **Koufax under pressure**. This is one of the most astounding bits of sportsdom I've ever read.

In his Historical Baseball Abstract, in his section on Don Drysdale, Bill James set out to evaluate the charge that Drysdale was an unperforming pitcher -- one who lost a lot of games he should have won -- by arguing that Drysdale simply appeared to underperform because he was pitching next to (or, worse, usually the day *after*) his teammate Koufax, who was an overperforming pitcher.

But can you really overperform when you have stuff like Sandy's? James looked at the numbers to find out. He focused on what percentage of the time each pitchers won games at different levels of run support and compared those percentages and performances to the statistical averages for such run support throughout Major League Baseball. Because MLB teams average about a bit over 4 runs scored a game, e.g., an average MLB pitcher who gets 4 runs of support will win just under half his games, and he'll win over half the games in which his team scores 5 runs.

So James takes both Drysdale's and James's games in 1963 and 1964, when both were at their peaks, and compares how they did in close games and games in which their team scored few runs. He finds that Don Drysdale generally won the games he should have, given the run support he actually got -- more than half of those he got 4 runs of support, e.g., and respectable and better-than-MLB-average win-loss record.

> [I wanted] to see if there was a pattern of Drysdale's losing the close games or anything. What fans will often say about certain pitchers is that 'this guy's a loser. You give him three runs, he allows four. You give him one, he'll give up two."
>
> Drysdale in 1964 and had a poor record in one run games (2-7). That's a little unfair, because you lost four games 1 to 0, but there you have it; he pitched well when the other guy -- usually Juan Marichal, who used to pitch against Drysdale low -- was pitching a shutout. He was 5-3 in one run games in 1963, so for the two seasons as a whole he was 7-10 in one run games. He was also 38-13 games decided by two runs so that's not an illustrious record those two seasons, even though he was 27-15 in other games -- but remember, those were seasons in which he was "under-efficient," whereas in other seasons he was "over efficient." It must be assumed that he probably won most of his close games in 1962 in 1965.
>
> But really, he won, even in those seasons, about as often as you could reasonably expect given his offensive support. Given five or more runs to work with, Drysdale's record over those two seasons was 23-1, which is pretty near perfect. Given for runs to work with, he was 7-5, which is 10-10. Given three runs to work with, he was 4-6, which is pretty decent. Given two runs to work with, he was 3-6, which is excellent.... he won all the games that he should have won, and he split the ones that he should have split.

But as James explains, Koufax -- this is sort of frightening -- actually got *harder* to beat as he received *less* run support. When his team wasn't scoring, he simply choked the other team to death.

> While I was doing Drysdale, I figured I might as well do Koufax, too. Read these figures carefully. Given five or more runs to work with, Koufax was 18-1, about the same as Drysdale. Given four to work with, he was 8-2. That's sensational -- you get four runs and win 80% of the time, you're doing the job.
>
> Given three runs to work with, Koufax was 9-0. Given just two runs to work with, Koufax was 6-3. And given only one run to work with, Sandy Koufax won three out of four decisions.
>
> Think about it. Given one, two or three runs to work with, Koufax was 18-4. That's an unbelievable accomplishment.
>
> So Drysdale couldn't match that. Well, who could?

Like I said: Man was a god.

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Comments

1. Agreed about Koufax! And as long as we're telling baseball stories, you have to give Drysdale extra credit for when he was broadcasting and was the first to say "A good piece of ash is hard to find". And he said it to the man that invented the batting glove - Hawk Harrelson.
   Now back to your regularly scheduled curve ball...
   Posted by: J-Dog | May 20, 2009 8:46 AM

2. I'm curious - if the curveball illusion is so good at fooling batters, what about umpires? Has anyone researched whether umps are also fooled, e.g. into calling balls as strikes or vice versa?
   Posted by: qetzal | May 20, 2009 2:15 PM

3. Having both hit and umped, I can assure you the ump's perceptual job is much easier: He can process what he's seen (and note where the catcher caught the ball as well) before declaring it strike or ball.
   That said, some umps are better than others are judging whether a ball's curving or slanting path has taken it through any part (even the very back cubic centimeter) of the 3-dimentional strike zone. "Any part of the ball, any part of the zone." Yet many umps are much quicker to give a strike call to a pitch that has nicked through (or even just missed) the backmost corner of the zone and landed in a catcher's mitt that's behind the plate than they will to a pitch that nicks the FRONT corner of the zone and then swings out of the zone to land in the catcher's mitt 6 inches wide of the back of the plate. I see this myself frequently when pitching: As a righty, I will more readily get a strike call on a (left-bending) curve that is thrown inside to a right-handed hitter and bends left to land behind the plate -- even if it doesn't actually pass over the plate (as it's supposed to really qualify as a strike) than I will if I throw a pitch that passes over the outside (to my left) edge of the plate and bends left to land wide. I get the former call about 2-3x more often than the latter. Which is fine with me; a curveball 3 inches inside the plate is pretty hard to hit, and most batters will take it -- and grimace, with good reason, when it's called a strike. I got rung up as a batter on exactly that pitch last week, and wasn't a bit happy about it.
   Yet the latter is, technically, just as much a strike as the former.
   In practice, of course, a strike (barring a swing) is a pitch the ump thinks is a strike, and a good pitcher knows or learns quickly an ump's tendencies and adjust likewise. I find
   Posted by: David Dobbs | May 20, 2009 3:44 PM

4. Point taken, qetzal. I'd say it's a safe bet that more call errors are made on breaking balls (curve and others/sharply breaking pitches) than fastballs. The trajectory is easier to track for a number of reasons, and the difficulty can only be increased by this illusion effect -- though the ump's difficulty is not increased by the illusion nearly as much as the batter's is.
   Posted by: David Dobbs | May 20, 2009 5:50 PM

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Author and journalist David Dobbs writes on science, medicine, nature, education, and culture for the *New York Times Magazine*, *Slate*, *Scientific American Mind*, and other publications. He is also the author of three books (see below), most recently Reef Madness: Charles Darwin, Alexander Agassiz, and the Meaning of Coral. For more on him and his work, see About or his website.
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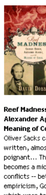

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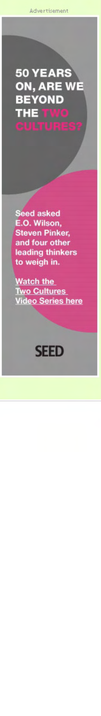
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