HOW STATISTICAL ANALYTICS HAS CHANGED SPORTS

BY PETER DIZIKES

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WHEN STEPHEN CURRY of the Golden State Warriors launches another salvo of mind-blowing three-point shots, he is not just creating highlights for sports news shows. He also is playing the percentages. After all, Curry made almost 50% of his three-pointers during the regular season. The Warriors are the defending National Basketball Association champions, and followed up their 2015 title-winning performance by posting the league's best regular-season record in league history during the 2015-16 campaign —their 73-9 record was one victory better than the Michael Jordon-led Chicago Bulls of 1995-96. The Warriors also led the league in three-point shooting percentage.

Thus, the Warriors' winning edge: being a top three-point shooting team is more efficient than being a top two-point shooting team, an argument basketball analysts have been making for years. Now the game of basketball, embracing three-point shooting like never before, has caught up with its theorists.

Those theorists include Daryl Morey, general manager of the Houston Rockets, the only team that shoots three-pointers more frequently than the Warriors. Outside shooting helped boost the Rockets to the NBA's Western Conference finals last season, where they lost to the Warriors, who also bested Houston in the first round of this season's playoffs. Morey is cofounder of the Massachusetts Institute of Technology Sloan Sports Analytics Conference, the sports world's signature showcase for empiricism. The 10th annual SSAC, held March 11-12 at the Boston Convention and Exhibition Center, drew 3,900 attendees from 32 countries, most of whom love using numbers to question conventional sports wisdom.

"Good analysis is about asking questions and questioning assumptions," said panelist Nate Silver, founder of the analytics site FiveThirtyEight.com, who was a baseball analyst before adding political forecasting to his job description.

One way to look at sports analytics is as a series of battles over the right way to understand sports. You might call these the games within the games, and they were fully on display at this year's SSAC.

Sports analytics thrives in part because of the ethos that sports are best understood from the outside. Much of the groundbreaking work in sports analytics has come from avid fans not beholden to tradition. The personification of this is baseball analyst Bill James, who in the 1980s gained a national following for his annual *Baseball Abstract* books. James is one of the more well-known members of the Society for American Baseball Research and, in recognition of SABR's work, he refers to his statistical analysis as Sabermetrics. Michael Lewis' 2003 bestseller *Moneyball: The Art of Winning an Unfair Game*—and a subsequent movie starring Brad Pitt—about the way the Oakland Athletics applied Jamesian thinking, further popularized analytics.

This year, SSAC reunited Lewis, James, and former Athletics executive Paul DePodesta on one panel, where they reflected on the culture of baseball. After all, old-school baseball people never have resisted analytics quietly. Just a few days before SSAC, Hall of Fame pitcher Goose Gossage lamented that baseball "is becoming a freaking joke because of the nerds who are running it." James, who faced years of resistance to his ideas, observed how anomalous such rants now seem. "You used to have to pay attention to those guys," he said. "Now you can just ignore them."

That increasingly is the scenario in most sports. "Hey, that war's over, and we won," said Brian Burke, a football analyst for ESPN, speaking on the football analytics panel. SSAC embodies a major shift in the field: at this year's event, 130 professional teams and leagues were represented. The outsiders have become insiders.

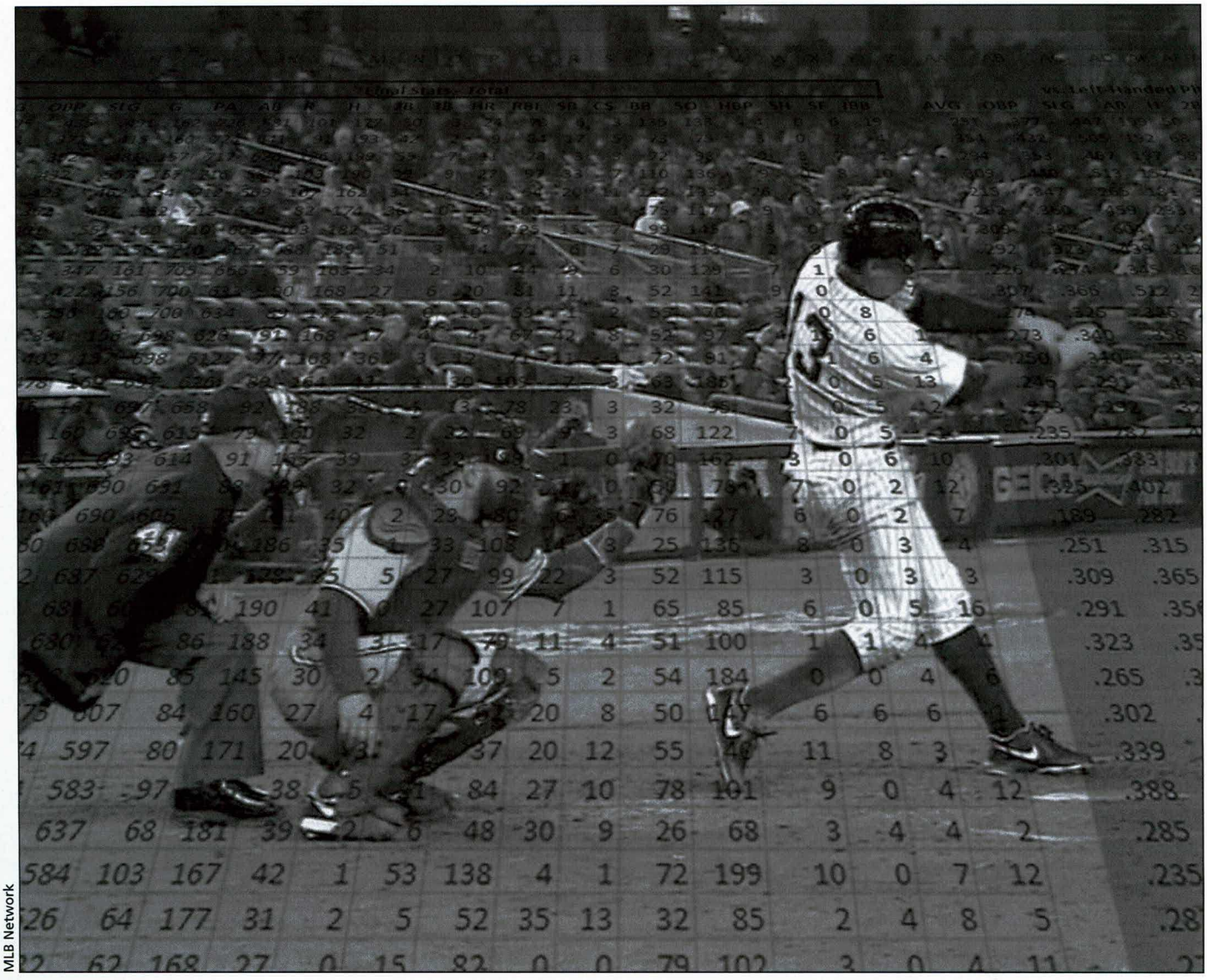
[In Gossage's defense, his criticism of general managers who appear to be stat geeks came as an afterthought to a legitimate outburst concerning how many modern-day players do not respect the game: specifically, not running out ground balls; standing at home plate to admire home runs; and overt gestures of braggadocio after unloading extra-base hits, à la NFL players. Pitchers, too, have gotten into the "me-first" act with first-pumping routines after strikeouts.]

Analytics, of course, are not a full-proof panacea. Take the NBA's Philadelphia 76ers, for instance. The franchise was bought a few seasons ago by a management group intent on taking an extreme analytical approach, and the front office quickly set about accumulating potentially valuable draft picks, using advanced biometrics, and more—things analytics types generally see as forward-looking. Alas, the 76ers have compiled the league's worst record since the club's sale. Yet, the front office has stuck to an analytics-friendly mantra: "Trust the process." You may not be able to control all of your results, the idea goes, but you always can take the right approach.

However, when a team performs this poorly, should you trust your analytical process or question it? That was the subject of some colorful remarks by Jeff Van Gundy, the high-profile former NBA coach and now announcer, who coached the Rockets for a few years under Morey and has used analytics on the job. "It's about the results," Van Gundy said on the "Analytics in Action" panel. That can sound like anathema to analytics people but, if a supposedly analytical approach is not working, Van Gundy insisted, then the results should be used to provide feedback about that process.

The truly analytical mindset, he implied, is to keep questioning your ideas—and, when empirical answers about basketball are unclear, Van Gundy observed, "I would rather have people say, 'I don't know.' " After all, he added, sounding much like a complex systems analyst: "Cause and effect is so hard to determine."

James, among others, used to make his models freely available to readers. Contemporary analysts are less apt to do so, and baseball has since become littered with proprietary numbers like the controversial Wins Above Replacement (WAR). So, debate continues in sports analytics about whether open access



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helps the state of knowledge or whether secrecy is more beneficial.

SSAC's annual research paper competition produced 80 full-length papers this year. Researchers presented the top eight papers before large crowds. Among the four finalists was "Recognizing and Analyzing Ball Screen Defense in the NBA," coauthored by John Guttag, a professor of computer science and electrical engineering at the Massachusetts Institute of Technology; Joel Brooks, an MIT doctoral candidate; Jenna Wiens, professor of computer science and engineering at the University of Michigan; and Avery McIntyre, a researcher at the University of Michigan. The paper presented an automated method for analyzing the ways basketball teams defend ball screens.

The overall first prize-winning paper, "The Thin Edge of the Wedge," used rich data to predict shot patterns in the understudied sport of tennis. "We're just scratching the surface of what we can do," suggested Patrick Lucey, one of the coauthors.

The research paper competition also featured a popular vote by attendees on the best remaining paper. This year's winner, Jeremy Hochstedler, is a Ph.D. candidate at MIT, who, along with some of his cousins, spent months cataloging video of Indianapolis Colts quarterback Andrew Luck in order to develop a new method for judging whether Luck picks out open receivers well. (He does.) Hochstedler is pursuing a joint degree in the School of Engineering and School of Management.

Sports gambling attracts analytical-minded sports fans and is itself an area of research. Consider the current vogue for daily fantasy sports, now tied up in courtrooms where judges are assessing the question of whether such activities are games of skill or chance. Annette Hosoi, MIT professor of mechanical engineering, has been studying that question based on two years' worth of data from daily fantasy sports companies. She outlined her findings:

Think of betting games, Hosoi suggested, as being situated on a spectrum running from luck to skill. Betting on coin flips would be close to pure luck. Many sports, she found, line up on different parts of that spectrum: moving from luck to skill, she told the audience, the research found that after coin flipping, next comes mutual fund investing; then poker; ice hockey and fantasy hockey; football; baseball; fantasy baseball and fantasy football; basketball and fantasy basketball; and cycling.

Basketball, and gambling on it, may be more skill-based partly because of the number of possessions in a game, which enables a superior team to prove its worth: "If you get one lucky shot, that's not [usually] going to change the outcome of the game."

This type of analysis was not on anyone's radar a few years ago, before daily fantasy sports became a big business, but sports analytics and the SSAC keep producing surprises. We may not know where sports analytics will be a decade from now, Morey said at SSAC's opening session, but one thing seems sure: "I do know that what's next is here." ★

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