

STATISTICAL SIGNIFICANCE

Sports statistics such as a batting average don't involve the scientific discipline of statistics at all, but are merely numbers determined by simple arithmetic. Statistics in the sense of the scientific discipline of collecting, analyzing, and understanding data can yield powerful insights and advantages for those who employ it for sports of any kind. The use of statistical science in sports continues to evolve, with its power and utility well established in certain areas, but providing new challenges as a result of fresh sources and ever-increasing amounts of data.

Statistical Science Applied to Sports

DISCOVERING "HIDDEN" TALENT

Baseball teams are increasingly using a more statistical approach in their decision-making and talent evaluations. Thanks to the vast amount of data collected during games, statisticians can apply sophisticated analyses to assess a player and identify factors that contribute to his success. Teams use this "Moneyball" method to uncover overlooked young talent, as well as players in the major leagues undervalued by their teams. This approach of identifying "hidden gems" is expanding to other sports and influencing non-sports businesses.

RANKING TOP TEAMS IN COLLEGE SPORTS

For NCAA championship tournaments in baseball, basketball, and hockey, only a select number of teams are chosen. Because of the large number of eligible teams and their varying opponents, it is a challenge to select and rank the teams for the playoff tournaments. Statistical models play a key role in this process through the analysis of the outcomes of all games while accounting for such differences as the quality of the opponents faced.

ANTICIPATING OPPONENT BEHAVIOR

Coaches and managers constantly are seeking an advantage over their team's opponent. For example, using the frequency of specific plays a team runs inside the 20-yard line, NFL teams can use statistical analysis to predict the likelihood of specific plays being run for specific situations. Teams also are developing more complicated statistical models to predict the frequency of the type of plays an opponent calls at any place on the field, regardless of score and time remaining. Statistics is used widely in other sports, too. Volleyball coaches track serving tendencies or determine the best way to block a specific attack.

JUDGING PLAYER PERFORMANCE

Decisions in sports—Who to put in the starting lineup? Who to take the last shot?—are increasingly based on performance data, but are not without their challenges. For example, a baseball manager choosing to rest a player with limited success against that day's opponent may understand the judgment often is based on small amounts of data and compounded by the constantly changing nature of human performance. In hockey, judging performance is complicated by the infrequency of goals scored and the practice of players subbing as "lines." The statistical perspective is crucial for addressing these challenges, framing them through the statistical lens of dealing with uncertainty and variability.

ADDRESSING SPORTS CLICHÉS

When a basketball player is called "hot," it implies she likely will score the next basket because she is "in the zone." Yet, studies show it is common for skilled college or professional players to make several consecutive shots, even when successive shots are independent. Similarly, in baseball, they say, "Never make the first or third out at third base." Further, a player is called "clutch" when he hits better with runners in scoring position in late-game situations. With scant data for these situations, the application of rigorous statistical techniques is essential to better understand what wisdom, if any, these sayings hold.

MAINTAINING INTEGRITY IN SPORTS

Statistics also plays a key role in ensuring the integrity of sports ranging from baseball and basketball to cycling and sumo wrestling. Sporting events can be tainted by many factors, such as tanking, discrimination, doping, and judging bias. Demonstrating such breaches can be extremely challenging, however. Statistical analysis can help demonstrate the integrity—or lack thereof—of a sport through the sophisticated examinations of the data, disentangling the many intricate factors.

"Statistical Science Aiding Sports" is part of Statistical Significance, a series from the American Statistical Association documenting the contributions of statistics to our country and society. For more in this series, go to www.amstat.org/outreach/statsig.cfm. The American Statistical Association is the foremost professional society of statisticians, representing 19,000 scientists in industry, government, and academia: www.amstat.org. This Statistical Significance was produced under the supervision of the ASA Section on Statistics in Sports.

