Biased Decision-Making in Sport

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Research/statistical methodology
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Do professional coaches fall victim to subconscious psychological biases?

The recent developments in the field of sport analytics has given researchers the tools to examine an increasingly diverse set of topics within the world of sport in ways not previously possible (Alamar, 2013; Fry & Ohlmann, 2012). This study analyzes the decision-making processes of high level coaches under different contexts and then determines what psychological bias or biases caused the individual to make the choice they did. Past empirical research has examined people's decisions in different contexts and, from those contexts, made inferences about how those individuals made their decisions and what errors in their decision-making processes could have led to their suboptimal choices (Kahneman & Tversky, 1979; Kobberling & Wakker, 2005; Tom et al, 2007; Tversky & Kahneman, 1992). Previous researchers have been unable to separate the prior odds and likelihood ratio components of people's decision-making when studying real-world scenarios in a sport context (Carter & Machol, 1978; Carroll, Palmer, & Thorn, 1988; Carroll et al, 1989; Patel, 2012; Romer, 2006). Our research is different than the previous related research in that we utilize statistical models to gauge how people weight different information when making high-pressure decisions in sport and then use those results to determine which psychological biases or heuristics they yield to. We hypothesize that coaches are disproportionately weighting new information against prior information when making decisions, and thus, yielding to the representativeness heuristic.

Method

We evaluate the decisions of National Football League (NFL) coaches in fourth down situations. Fourth downs are considered to be high-pressure situations, which require coaches to use immediately available information to weigh their options and make the choice that they believe will maximize their team's chance of winning the game. Our data set consists of every NFL regular season play during the 2003-04 through 2014-15 seasons (468,699 observations and 45,589 fourth downs), which includes score, time remaining, field position, down and yards to go in the game-state information relative to the occurrence of each event. To test our hypothesis, we construct numerous Bayesian updating models to represent the impact of NFL coaches' decision-making on the likelihood of winning games. A Bayes' Rule formulation represents the in-game likelihood of winning while the likelihood ratios represent the decision-specific impacts on the games' outcomes. Regression analysis is used with both the prior probability and conditional likelihood components to test for psychological biases in NFL coaches' decision-making by estimating the the effect each component has on the coaches' decisions. These estimates form the basis of our hypothesis tests.

Findings

Preliminary results indicate that coaches are significantly over-weighting the conditional likelihood compared to the prior. This means that coaches in the NFL are guilty of succumbing to the representativeness heuristic when making fourth down decisions. While our method and results will be of interest to sport managers and analytic practitioners, our primary contribution is in the discernment of optimal decision making relating to outcomes. It is certain that sport psychology will be interested in theory, method, and results; so will organizational theorists concerned with investigating decisions within the greater context of organizations. It is also our aim to demonstrate that in-game sport contest information is a fruitful area for academics to examine and test hypotheses.