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Fast and frugal heuristics in sports

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Abstract

Objectives: This paper summarizes the fast-and-frugal-heuristics (FFH) approach to judgment and decision making, particularly as it applies to sports. The aim is to provide a framework through which current sports psychologists may apply this approach to better understand sports decision making.
Methods: FFH are studied using a variety of methods, including (1) computer simulations and mathematical analysis of heuristic performance as it depends on environmental structure (what we call the ecological rationality of heuristics); (2) empirical analysis of the heuristics, performance in naturally occurring environments; and (3) experimental research examining whether people actually use the identified heuristics.
Results: Simulations and analysis have shown that FFH can perform as well as complicated optimizing models while using less information and without integrating this information. Furthermore, in many cases FFH are more robust than optimizing models, outperforming these models when generalizing to new cases.
Conclusion: FFH depart from many models of human decision making in that they set a reasonable standard of rationality based on real-world constraints such as (a) limited time, information, and cognitive capacity, (b) decision tasks that may have no calculable optimal solution, and (c) the structured environments within which humans have learned and evolved. These simple heuristics are particularly

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appropriate in the sports domain, in which athletes often must make rapid decisions—that may ultimately make the difference between success and failure—with limited information and divided attention.

Keywords: Ecological rationality; Judgment and decision making; Recognition heuristic; Sport psychology and leisure; Take The Best; Take The First

Introduction

How might a scientist build a robot that can catch baseballs as effectively as a professional outfielder?[1] To make the question simpler, imagine that the ball is already on its descent, that its trajectory is in line with the outfielder, and that the goal is simply to be sure that the robot is in the right location at the right time so that the ball collides with it. One way to try to solve this problem would be to program all the relevant information into the robot that would be necessary to calculate the trajectory of the ball and where it will land (as well as some program for getting to that location as quickly as possible), and have the robot power through the calculations. Such relevant information would include, among other things, the ball's distance, its angle, velocity, and acceleration of descent, the wind speed and direction, as well as the necessary formulas for using these variables to correctly calculate the trajectory. This will be called the optimizing approach to cognition in that it uses and integrates all relevant information to make the best possible prediction.

Of course, actual outfielders do not have the capacity to accurately assess any of these variables, much less all of them. Nor would most outfielders have the physics training or cognitive ability to combine these variables into usable answers, particularly in the fractions of a second outfielders take before beginning to run for the ball (McLeod & Dienes, 1996). Indeed, even the robot would need a team of scientists with sensitive equipment and some kind of transmitter to send it the appropriate measurements. Nonetheless, a similar approach to studying human behavior is not uncommon among a large subgroup of researchers who use such optimizing models to both predict and evaluate human decision making.

Another approach would be to try to determine what processes baseball outfielders actually can and do use to solve the task. As it turns out, human decision makers often use simple rules that neither require all available relevant information nor integrate the information that is used, but that nonetheless allow the decision makers to accomplish their aims quickly and effectively given the environments within which they are used. Such simple rules are called heuristics. In the case of the outfielder catching the ball, one possible heuristic has been called the gaze heuristic (Gigerenzer, 2004a).

The gaze heuristic involves three steps (or building blocks): (1) Fixating one's gaze on the ball, and (2) starting to run and adjusting one's speed so that, (3) the angle of gaze remains constant. The gaze heuristic does not require knowledge of any of the variables required by the optimizing approach, nor does it require the outfielder to integrate information, yet it allows the outfielder to

[1]This discussion is drawn from a chapter on fast and frugal heuristics (Gigerenzer, 2004a) in the *Handbook of Judgment and Decision Making* (Koehler & Harvey, 2004).