Fast and Frugal Heuristics

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Definition

Fast and frugal heuristics refer to simple, task-specific decision strategies that are part of a decision maker's repertoire of cognitive strategies for solving judgment and decision tasks (Gigerenzer, Todd, & the ABC Research Group, 1999). Fast and frugal heuristics are simple to execute because they limit information search and do not involve much computation. Unlike many decision-making models in the behavioral sciences, models of fast and frugal heuristics describe not only the outcome of the decision-making process but also the process itself: Fast and frugal heuristics are composed of simple building blocks that specify how information is searched for (search rule), when information search will be stopped (stopping rule), and how the processed information is integrated into a decision (decision rule).

The term "heuristic" is of Greek origin meaning "to find out" or "to discover." This notion of heuristics differs from approaches that define heuristics as rules of thumb or as irrational shortcuts that result in decision biases. Fast and frugal heuristics yield decisions that are ecologically rational rather than logically consistent (see *ecological rationality*).

Examples

A decision maker's repertoire of cognitive strategies includes a collection of simple heuristics. As a hammer is ideal for hammering in nails but useless for sawing a board, so the heuristics are designed to solve particular tasks. For example, there are specific heuristics for choice tasks, estimation tasks, and categorization tasks. In the following, we will illustrate two prominent examples of fast and frugal heuristics-the recognition heuristic, which exploits a lack of knowledge, and the Take The Best heuristic, which deliberately ignores information. Both heuristics can be applied to choice tasks and to situations in which a decision maker has to infer which of two objects has a higher value on a quantitative criterion. Examples include inferring which of two stocks will perform better in the future, which of two cars is more reliable, or which of two job applicants is better suited for an open position.

The Recognition Heuristic. The recognition heuristic (RH) has been studied extensively with the often-used inference problem of deciding which of two cities is more populated. Goldstein and Gigerenzer (2002) asked students in the United States and Germany the following question: Which city has more inhabitants, San Antonio or San Diego? Given the differences in background knowledge about American cities, one might expect that American students would do much better on this task than German students. In fact, most of the German students did not even know that San Antonio is an American city. How did the two groups perform on this task? Astonishingly, Goldstein and Gigerenzer found the opposite of what one would expect: Whereas about two-thirds of the American students correctly inferred that San Diego has more inhabitants than San Antonio, all of the German students got this question correct. How could this be? The German students who had never heard of San Antonio had an advantage. Their lack of recognition enabled them to use the RH, which, in general, says: "If one of two objects is recognized and the other is not, then infer that the recognized object has the higher value with respect to the criterion." The American students could not use the RH because they had heard of both cities-they knew too much.

The RH is a powerful tool. It allows for fast decisions and yields reasonable decisions in many environments because recognition is often systematic rather than random. Domains in which the RH works well include sizes of cities, performances of tennis players in major tournaments, or productivity of authors. Conversely, the RH does not work well when, for instance, cities have to be compared with respect to their mayor's age or their altitude above sea level.

The Take The Best Heuristic. If the RH is not applicable because a decision maker recognizes both objects in a choice task or because recognition is not correlated with the criterion, a heuristic that considers cue information can be applied. The Take The Best heuristic (TTB) is a cue-based heuristic that does not require any information integration to make an inference but bases decisions on single cues. For instance, when inferring the size of a city, the decision maker could consider cues such as whether a city has an airport, an opera house, or a major exposition site. TTB's search rule specifies searching for the cues in the order of their validity. The validity of a cue is defined as the probability of making a correct inference under the condition that the cue discriminates, that is, one object has a positive and the other object a negative cue value. According to TTB's stopping rule, the information search is stopped as soon as a cue is found that discriminates, so that if the most-valid cue discriminates only one single cue is considered. Otherwise the next-most-valid cue will be considered. Finally, according to TTB's decision rule, TTB infers that the object that is favored by the cue that stopped the information search has the larger criterion value. If no discriminating cue is found TTB makes a random guess.

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Empirical Evidence

Studies on fast and frugal heuristics include (a) the use of analytical methods and simulation studies to explore when and why heuristics perform well; and (b) experimental and observational studies to explore whether and when people actually use fast and frugal heuristics. Systematic comparisons with standard benchmark models such as Bayesian or regression models have revealed that the performance of fast and frugal heuristics depends on the structure of the information environment (e.g., the distribution of cue validities, the correlation among cues). In many environments fast and frugal heuristics can perform astonishingly well-in particular, in generalizing, that is, when making predictions for new cases that have not been encountered before. Empirical studies indicate that humans use fast and frugal heuristics especially when under time pressure, when information search is costly, or when information has to be retrieved from memory. Recent studies have investigated how people adapt to different environments by learning; these studies illustrate that people apparently learn to select the heuristic that performs best in a particular environment (Rieskamp & Otto, 2006). Moreover, evidence shows that people also apply fast and frugal heuristics when making inferences in groups (e.g., Reimer & Katsikopoulos, 2004).

Further Readings:

Gigerenzer, G., Todd, P. M., & the ABC Research Group. (1999). *Simple heuristics that make us smart.* New York: Oxford University Press.

Goldstein, D. G., & Gigerenzer, G. (2002). Models of ecological rationality: The recognition heuristic. *Psychological Review*, *109*, 75-90.

Reimer, T., & Katsikopoulos, K. (2004). The use of recognition in group decision-making. *Cognitive Science*, *28*, 1009-1029.

Rieskamp, J., & Otto, P. E. (2006). SSL: A theory of how people learn to select strategies. *Journal of Experimental Psychology: General*, *135*.