Heuristics

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Heuristics are strategies that ignore information in order to make faster decisions. Traditional theories of decision-making (including the highly influential "heuristics-and-biases framework"; Tversky & Kahneman, 1974) suggest that heuristics are suboptimal shortcuts that lead to systematic errors, trading accuracy for speed. These frameworks imply that heuristics are irrational and that decision-makers would be better off if they could avoid heuristics altogether.

In reality, heuristics are extremely sensible, having proven to be reliable tools for successfully navigating diverse situations of uncertainty (Gigerenzer, Todd, & the ABC Research Group, 1999; Gigerenzer & Gaissmaier, 2011; Gigerenzer, Hertwig, & Pachur, 2011). For example, Ortmann et al. (2008) observed that, on average, stock portfolios created using the *recognition heuristic* (i.e., if one option is recognized and the other is not, choose the recognized option) outperformed unplanned portfolios, the market, managed funds, and stock experts. Heuristics are not only useful but, perhaps more importantly, they are efficient; heuristics are both fast and frugal, limiting the amount of information processed while giving comparable (if not superior) results than their more complex counterparts. Consequently, heuristics make perfect tools for situations of bounded rationality, scenarios where decision-makers have limited capacities and resources. This understanding stands in stark contrast to traditional economic approaches, which assume decision-makers are able to invest unlimited resources in a given problem, making them untenably costly and thus unrealistic cognitive strategies.

Ecological Rationality

Ecological rationality describes robust fit of cognitive mechanisms that have evolved to solve recurrent problems in regularly encountered environments. Fast and frugal heuristics meet the criteria of ecological rationality because they reflect speed and efficiency of cognitive processing; they also reflect robust sensitivity to the structure of decision-making environments.

Simon (1990) elegantly illustrated the concept of ecological rationality with a scissor analogy: Human behavior is shaped by the two interdependent blades of (1) the task environment, and (2) the actor's ability to carry out a given strategy. Heuristics are useful because they are typically within the limit of the actor's capabilities, but only in certain task environments. Heuristics are also typically more robust then other decision-making tools. They are not over-fitted to a single environment and can therefore be utilized in multiple contexts. Heuristics are also very specific in terms of inputs, making dealing with ambiguous contexts more tenable as they do not have to search through all the data, just the specific criteria outlined.

Building Blocks of Heuristics

Gigerenzer and colleagues (1999) proposed three main building blocks of heuristics: (1) search rules, (2) stopping rules, and (3) decision rules. Search rules dictate how decision-makers search possible options. Stopping rules detail the circumstances under which the search will stop. Finally, decision rules outline how the final decision is reached.

For example, when deciding what to eat, people appear to use a *lexicographic heuristic*, tending to consider only their most important criteria (e.g., taste) instead of taking a weighted sum of all the possible criteria (e.g., taste plus price, texture, nutrition content, convenience, ethical concerns, among others.; Scheibehenne, Miesler, & Todd, 2007). In this instance, the individual dining searches through the criteria (search rule). They then find the most important criteria (stopping rule). Finally, the individual chooses the option that rates highest on that criteria (decision rule). These three simple rules outline a process that is fast, frugal, and efficient.

Examples of Heuristics

Heuristics can be used in a variety of settings, including physical, social, and group

situations. For example, baseball players use the *gaze heuristic* to catch a ball flying through the air, maintaining a constant optical angle between themselves and the ball, rather than calculating the balls trajectory in three-dimensional space (McLeod & Dienes, 1996). Certain animals also use the gaze heuristic to catch prey or to pursue mates (Gigerenzer, 2007, Shaffer et al. 2004).

Heuristics can also be used in social situations. Axelrod (1984) showed that individuals often use a heuristic "tit-for-tat" strategy in cooperative situations. In utilizing this strategy, individuals initially choose to cooperate. After that, decision-makers simply replicate their partner's most recent choice: if the other person defects, the decision-maker defects. If their partner cooperates, the decision-maker cooperates. This simple strategy leads to a high chance of avoiding potentially harmful social situations, but is also extremely robust and efficient to apply.

Groups also appear to use heuristics. For example, Gonzales et al. (2016) observed that football teams make in-game decisions consistent with *risk-sensitivity theory*, which hypothesizes that decision-makers simply chose riskier options when less risky options are unable to meet a highly salient need (reviewed in Mishra, 2014). Teams would choose the riskier option of passing more frequently whenever running (the less risky option) was unlikely to attain a salient goal (i.e., getting a first down or winning the game).

Heuristics provide a useful tool for navigating a world full of uncertainty. When used in the appropriate situation, a heuristic can be a mechanism that allows a decision-maker to make good decisions without allocating excessive resources to solving the problem. Traditional approaches to understanding decision-making ignore necessary constraints of human cognition (i.e., they reflect "unbounded" rationality as opposed to "bounded" rationality). However, an evolutionary account requires that decision-making mechanisms be fast, frugal, and robustly

fitted to environments of decision-making, thus highlighting the importance of heuristics in decision-making.

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