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Stanovich's arguments against the "adaptive rationality" project: An assessment

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ABSTRACT

This paper discusses Stanovich's appeal to individual differences in reasoning and decision-making to undermine the "adaptive rationality" project put forth by Gigerenzer and his co-workers. I discuss two different arguments based on Stanovich's research. First, heterogeneity in the use of heuristics seems to be at odds with the adaptationist background of the project. Second, the existence of correlations between cognitive ability and susceptibility to cognitive bias suggests that the "standard picture of rationality" (Stein, 1996, 4) is normatively adequate. I argue that, as matters stand, none of the arguments can be seen as fully compelling. Nevertheless, my discussion is not only critical of Stanovich's research, as I also show that (and how) his research can push forward the so-called "rationality debate" by encouraging greater theoretical and experimental work.

1. Introduction

Gigerenzer et al. have recently articulated a new perspective on rational behaviour and cognition (e.g. Gigerenzer et al. 1999). I will refer to their view as "adaptive rationality" (henceforth, AR). An important element of their proposal is their theory of the "adaptive toolbox", describing the psychological adaptations that humans and other organisms use when making decisions. These authors claim that evolution has endowed us with a set of fast-and-frugal heuristics, which are simple rules that are easy to apply. In light of their appeal to evolutionary considerations, I will treat the AR project as an instance of evolutionary psychology, which I take to encompass a broad range of assumptions within the general framework of evolutionary approaches to psychology.[1] Importantly, on the background of this descriptive view, AR theorists have also argued for a replacement of the so-called "standard picture of rationality" (Stein, 1996, p.4), which claims that to be rational means to reason according to principles based on first-order logic, probability theory, and expected utility theory. According to AR scholars, what ultimately matters to justify normative principles is success in the real world, where success refers not only to the fulfilment of desires, but also to the achievement of epistemic goals (cf. Gigerenzer & Sturm, 2012, 254).[2] Interestingly, while the heuristics people use often violate basic tenets of rationality, such as transitivity, they also seem to lead to desirable outcomes, assessed against both epistemic goals (e.g. Gigerenzer & Goldstein, 1996) and prudential goals (e.g. Hertwig & Gigerenzer, 1999; Lenton, Penke, Todd, & Fasolo, 2013).

Emphasising the importance of the goals people entertain, their computational limitations, and the characteristics of different environments, AR theorists have tried to drive a wedge between the "standard picture of rationality" and the success-oriented perspective of AR. AR theorists often present their perspective as

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[1] It is less clear, however, whether AR theorists can be associated with a narrow interpretation of evolutionary psychology (cf. Carruthers, 2006; Schulz, 2011, 1278), which signifies the approach developed by Cosmides, Tooby and Buss and adopts a narrower range of assumptions, such as massive modularity (cf. Buller, 2005).

[2] It is important to note, however, that in the literature the term 'success' is often taken to refer to practical success only (achieving one's desires), excluding cognitive aims and standards. I would like to thank an anonymous reviewer for drawing my attention to this point.

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being "in stark contrast to classical definitions of rationality" (Rieskamp & Reimer, 2007, p. 273), according to which reasoning and behaviour are rational when they conform to norms of logic, statistics, and probability theory. Yet, this does not mean that according to AR theorists following standard norms of rationality is wrong in all contexts. After all, in some domains they invoke norms of the standard picture themselves (e.g. Gigerenzer & Gray 2011). What this means, however, is that behaviour departing from norms of the standard picture is successful in a significant number of domains, and that as a consequence those norms cannot be used as benchmarks of rationality.[3]

This paper focuses on Stanovich et al.'s research on individual differences in judgement and decision-making. In particular, in a series of publications Stanovich et al. have argued that their reported findings have important implications for the "rationality debate" and ultimately undermine the AR project (e.g. Stanovich, 2011b).

The goal of this paper is to assess whether Stanovich's arguments undermine the AR project. The first argument is supposed to challenge the adaptationist background of AR. Stanovich's reported findings on heterogeneity in the use of heuristics seem to be at odds with the idea that adaptationist pressures led to their use; one would expect their use to be far closer to universality if adaptationist pressures had led to them.[4] The second argument questions instead the normative claims made by AR theorists. The fact that people with higher cognitive ability follow standard norms of rationality seems to suggest that those rational norms are normatively valid and there to stay, and that the perspective of AR should not replace the "standard picture of rationality".[5] I argue, however, that Stanovich's arguments fail to undermine the AR project. At least in principle, AR theorists can accommodate findings on heterogeneity, and I discuss several moves that are open to them. Moreover, even the most plausible version of the second argument cannot be seen as fully compelling: the claim that people who score higher at tests of cognitive ability achieve better life outcomes because they do not reason heuristically remains at a hand-waving level and is not empirically well supported. It is important to note, however, that the discussion here might have broader implications for the 'rationality debate', since other researchers have applied evolutionary considerations to understand human reasoning (e.g. Cosmides & Tooby, 1994; Mercier & Sperber, 2011), and other researchers have questioned the "standard picture of rationality" (e.g. Pothos & Busemeyer, 2014).

The paper is structured as follows. In Section 2, I discuss Stanovich's research on individual differences. In Section 3, I reconstruct and assess the first argument based on his research. In Section 4, I do the same for the second argument. In light of this discussion, I then conclude in Section 5.

2. Stanovich's research on individual differences in judgement and decision-making

Research in the field of judgement and decision-making has described a variety of heuristics that reasoners seem to deploy (e.g. Gilovich et al. 2002; Gigerenzer & Goldstein, 1996). Familiar examples are the *availability heuristic* (judge an event frequency by the ease with which instances of the event can be recalled; Tversky & Kahneman, 1973) and the *recognition heuristic* (if you recognize only one item in a set, choose that one; Goldstein & Gigerenzer, 2002). While several heuristics have been associated with human decision-making and formally modelled, little attention had been paid to the existence of individual differences in their use until Stanovich et al. (e.g. Stanovich, 1999; Stanovich & West, 2008) started to conduct a stream of individual differences studies involving reasoning and decision-making. A result of their research is that there is remarkable heterogeneity in the use of heuristics. Consider the Conjunction fallacy (Tversky & Kahneman, 1983). Given the story of Linda, a person who took part in antinuclear demonstrations, majored in Philosophy, and some other activities, people judge of that person that it is more probable that she should be a bank teller and active in the feminist movement, than it is that she should be a bank teller. This phenomenon is usually interpreted as an indication of irrationality, because it violates the conjunction rule of probability theory, which states that the probability of a conjunction is always smaller than or equal to the probability of one of its conjuncts. While most of the subjects in Stanovich's experiment displayed the conjunction effects, some did not (e.g. Stanovich, 1999). Stanovich has pointed out that "what has largely been ignored is that although the average person might well display an overconfidence effect, underutilize base rates, violate axioms of probability theory, and so forth, on each of these tasks, some people give the standard normative response" (2011b, 13). There is systematic variability in all of these tasks: while people have been shown to have a strong propensity to use heuristics, not everyone does. In fact, a sizeable number of people do not deploy heuristics. Moreover, these people do not just randomly fail to use heuristics, but they systematically reason in a very different way from other humans. In the main, Stanovich has focused on the cognitive strategies invoked in the "heuristics-and-biases" tradition (e.g. Gilovich, Griffin, & Kahneman, 2002; Nisbett & Ross, 1980), but large individual variability in strategy use has been reported also with regard to the heuristics generally modelled within the AR framework, like in the case of the *recognition heuristic* (cf. Richter & Späth, 2006). The evidence available strongly supports a scenario where different types of reasoners, namely heuristic and non-heuristic users, coexist. Specifically, for several classes of reasoning and decision-making tasks there are significant cross-task correlations: people that do not use heuristics in one context also do not do so in another (Stanovich & West, 1998, 2000; West, Toplak, & Stanovich, 2008).

Stanovich's research also shows that there are important correlations between the use of heuristics and cognitive abilities. It is useful to introduce briefly the concept of cognitive ability. When a diverse range of mental tests (e.g., understanding paragraphs, doing arithmetic, following instructions, estimating lengths, remembering words, identifying absurdities in pictures) is performed by a large group of people, the associations among the test scores form a pattern: no matter what type of mental work the tests involve, people who do well on one type of mental task tend to do well on all of the others. This phenomenon is known as general cognitive ability and it is usually shortened to just a lowercase italicized *g*.

Using standard measures of general cognitive ability, Stanovich and colleagues examined effects that are among the most known in the literature, such as base-rate neglect, framing effects, and conjunction effects, and the surprising result of their research was that cognitive ability is associated with performance in those tasks. It seemed that people with higher cognitive ability were less susceptible to cognitive biases. But the accumulating findings have also resulted in some conflicting results. In particular, some evidence collected by Stanovich has more recently suggested that

[3] This clarification was prompted by an anonymous referee, for which I am grateful.

[4] My reconstruction of this argument follows Kelman's (e.g. 2013, 355). I take such reading to provide the strongest version of Stanovich's attack on the adaptationist background of AR (cf. Stanovich, 2004, chap. 5).

[5] For instance, Stanovich writes that 'one aspect of this variability that researchers have examined is whether it is correlated at all with cognitive sophistication. […] We might take the direction of this association as a validation of the normative models' (2011b, 14).