Running Head: HOW CAN DECISION MAKING BE IMPROVED?

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Abstract

The optimal moment to address the question of how to improve human decision making has arrived. Thanks to fifty years of research by judgment and decision making scholars, psychologists have developed a detailed picture of the ways in which human judgment is bounded. This paper argues that the time has come to focus attention on the search for strategies that will improve bounded judgment because decision making errors are costly and are growing more costly, decision makers are receptive, and academic insights are sure to follow from research on improvement. In addition to calling for research on improvement strategies, this paper organizes the existing literature pertaining to improvement strategies, highlighting promising directions for future research.

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Daniel Kahneman, Amos Tversky, and others have clarified the specific ways in which decision makers are likely to be biased. As a result, we can now describe how people make decisions with astonishing detail and reliability. Furthermore, thanks to the normative models of economic theory, we have a clear vision of how much better decision making could be. If we all behaved optimally, costs and benefits would always be accurately weighed, impatience would not exist, no relevant information would ever be overlooked, and moral behavior would always be aligned with moral attitudes. Unfortunately, we have little understanding of how to help people overcome their many biases and behave optimally.

The Big Question

We propose that the time has come to move the study of biases in judgment and decision making beyond description and toward the development of improvement strategies. While a few important insights about how to improve decision making have already been identified, we argue that many others await discovery. We hope judgment and decision-making scholars will focus their attention on the search for improvement strategies in the coming years, seeking to answer the question: how can we improve decision making?

Why the Question Is Important

Errors Are Costly

We believe the importance of this question is somewhat self-evident: decisions shape important outcomes for individuals, families, businesses, governments, and societies, and if we knew more about how to improve those outcomes, individuals, families, businesses, governments, and societies would benefit. After all, errors induced

by biases in judgment lead decision makers to undersave for retirement, engage in needless conflict, marry the wrong partners, accept the wrong jobs, and wrongly invade countries. Given the massive costs that can result from suboptimal decision making, it is critical for our field to focus increased effort on improving our knowledge about strategies that can lead to better decisions.

Errors Will Get Even Costlier

The costs of suboptimal decision making have grown, even since the first wave of research on decision biases began fifty years ago. As more economies have shifted from a dependence on agriculture to a dependence on industry, the importance of optimal decision making has increased. In a knowledge-based economy, we propose that a knowledge worker's primary deliverable is a good decision. In addition, more and more people are being tasked with making decisions that are likely to be biased – because of the presence of too much information, time pressure, simultaneous choice, or some other constraints. Finally, as the economy becomes increasingly global, each biased decision is likely to have implications for a broader swath of society.

Decision Makers Are Receptive

Because decision making research is relevant to businesspeople, physicians, politicians, lawyers, private citizens, and many other groups for whom failures to make optimal choices can be extremely costly, limitations uncovered by researchers in our field are widely publicized and highlighted to students in many different professional and undergraduate degree programs. Those who are exposed to our research are eager to learn the practical implications of the knowledge we have accumulated about biased decision making so they can improve their own outcomes. However, our field primarily

offers description about the biases that afflict decision makers without insights into how errors can be eliminated or at least reduced.

Academic Insights Await

Bolstering our efforts to uncover techniques for improving decision making is likely to deliver additional benefits to researchers interested in the mental processes that underlie biased judgment. Through rigorous testing of what does and what does not improve decision making, researchers are sure to develop a better understanding of the mechanisms underlying decision making errors. This will deepen our already rich descriptive understanding of decision making.

What Needs to be Done to Answer the Question

Assuming we accept the importance of uncovering strategies to fend off decision-making errors, the next question is where to begin? To address this question, we first briefly discuss how we define an optimal decision. We then organize the scattered knowledge that judgment and decision-making scholars have amassed over the last several decades about how to reduce biased decision making. Our analysis of the existing literature on improvement strategies is designed to highlight the most promising avenues for future research on cures for biased decision making.

Optimal Decision Making

As mentioned at the outset of this paper, we believe the normative models provided by economic theory provide a reasonable benchmark for optimal decision making. According to these models, among other things, preferences should be transitive and insensitive to minor changes in context. In addition, revealed preferences should be consistent with stated preferences, and mathematical errors in judgment should not

systematically arise (unless the computational power required to avoid such errors is excessive). We also add the stipulation that upon careful, cool reflection, a decision maker should remain satisfied after making a choice that the decision he or she made was the right one. Finally, we propose that an optimal decision is one that a decision maker would regard as the right choice regardless of whether she was evaluating her own decision or someone else's.

Debiasing Intuition: Early Failures

Before discussing successful strategies for improving decision making, it is important to note how difficult finding solutions has proved to be, despite significant efforts. In 1982, Fischhoff reviewed the results of four strategies that had been proposed as solutions for biased decision making: (1) offering warnings about the possibility of bias; (2) describing the direction of a bias; (3) providing a dose of feedback; and (4) offering an extended program of training with feedback, coaching, and other interventions designed to improve judgment. According to Fischhoff's findings, which have withstood 25 years of scrutiny, the first three strategies yielded minimal success, and even intensive, personalized feedback produced only moderate improvements in decision making (Bazerman and Moore, 2008). This news was not encouraging for psychologists and economists who hoped their research might improve people's judgment and decision-making abilities.

System 1 and System 2

We believe that Stanovich and West's (2000) distinction between System 1 and System 2 cognitive functioning provides a useful framework for organizing both what scholars have learned to date about effective strategies for improving decision making

and future efforts to uncover improvement strategies. System 1 refers to our intuitive system, which is typically fast, automatic, effortless, implicit, and emotional. System 2 refers to reasoning that is slower, conscious, effortful, explicit, and logical.

People often lack important information regarding a decision, fail to notice available information, face time and cost constraints, and maintain a relatively small amount of information in their usable memory. The busier people are, the more they have on their minds, and the more time constraints they face, the more likely they will be to rely on System 1 thinking. This is not always a mistake. In many situations, System 1 thinking leads to superior decision-making by improving efficiency without sacrificing quality (for example, see Slovic's study of expert stockbrokers, 1969; for a discussion of automatic decision-making and its sometimes positive results, see Bargh and Ferguson, 2000 or Dijksterhuis and Nordgren, 2006). There is also evidence that when making emotional choices (such as the choice of a spouse or piece of art), System 2 thinking can lead people to make decisions they later regret (Wilson and Schooler, 1991; Wilson, Lisle Schooler, Hodges, Klaaren, and LaFleur, 1993; Wilson and Kraft, 1993). In addition, in some complex decision making tasks, such as the task of choosing an apartment based on detailed data, unconscious thought has been shown to result in better choices than conscious thought (Dijksterhaus, 2004). However, in the many situations where we know that decision biases are likely to plague us (e.g., when evaluating diverse job candidates, estimating our percent contribution to a group project, choosing between spending and saving, etc.), relying exclusively on System 1 thinking is likely to lead us to make costly errors.

An Important Question: Can We Move from System 1 to System 2 When Appropriate?

We believe a number of promising strategies have been uncovered for overcoming specific decision biases in situations where we know people are susceptible to them by shifting decision makers from System 1 thinking to System 2 thinking.[1] One successful strategy for moving toward System 2 thinking relies on replacing intuition with formal analytic processes. For example, when data exists on past inputs to and outcomes from a particular decision-making process, decision makers can construct a linear model, or a formula that weights and sums the relevant predictor variables to reach a quantitative forecast about the outcome. Researchers have found that linear models produce predictions that are superior to those of experts across an impressive array of domains (Dawes, 1971). The value of linear models in hiring, admissions, and selection decisions is highlighted by research that Moore, Swift, Sharek, and Gino (2007) conducted on the interpretation of grades, which shows that graduate school admissions officers are unable to account for the leniency of grading at an applicant's undergraduate institution when choosing between candidates from different schools. The authors argue that it would be easy to set up a linear model to avoid this error (for example, by including in its calculation only an applicant's standardized GPA, adjusted by her school's average GPA). In general, we believe that the use of linear models can help decision makers avoid the pitfalls of many judgment biases, yet this method has only been tested in a small subset of the potentially relevant domains.

Another System 2 strategy involves taking an outsider's perspective: trying to remove oneself mentally from a specific situation or to consider the class of decisions to which the current problem belongs (Kahnmean and Lovallo, 1993). Taking an outsider's

[1] It should be noted that many strategies designed to reduce decision biases by encouraging System 2 thinking have proven unsuccessful. For example, performance based pay, repetition, and high stakes incentives have been shown to have little if any effect on a wide array of biases in judgment.

perspective has been shown to reduce decision makers' overconfidence about their knowledge (Gigerenzer, Hoffrage, & Kleinbölting, 1991), the time it would take them to complete a task (Kahneman & Lovallo, 1993), and their odds of entrepreneurial success (Cooper, Woo, and Dunkelberg, 1988). Decision makers may also be able to improve their judgments by asking a genuine outsider for his or her view regarding a decision.

Other research on the power of shifting people toward System 2 thinking has shown that simply encouraging people to "consider the opposite" of whatever decision they are about to make reduces errors in judgment due to several particularly robust decision biases: overconfidence, the hindsight bias, and anchoring (Larrick, 2004; Mussweiler, Strack, & Pfeiffer, 2000). Partial debiasing of errors in judgment typically classified as the result of "biases and heuristics" (see Tversky and Kahneman, 1974) has also been achieved by having groups rather than individuals make decisions, training individuals in statistical reasoning, and making people accountable for their decisions (Larrick, 2004; Lerner & Tetlock, 1999).

One promising debiasing strategy is to undermine the cognitive mechanism that is hypothesized to be the source of bias with a targeted cue to rely on System 2 processes (Slovic and Fischhoff, 1977). In a study designed to reduce hindsight bias (the tendency to exaggerate the extent to which one could have anticipated a particular outcome in foresight), Slovic and Fischhoff developed a hypothesis about the mechanism producing the bias. They believed that hindsight bias resulted from subjects' failure to use their available knowledge and powers of inference. Armed with this insight, Slovic and Fischhoff hypothesized and found that subjects were more resistant to the bias if they were provided with evidence contrary to the actual outcome. This result suggests that the

most fruitful directions for researchers seeking to reduce heuristics and biases may be those predicated upon "some understanding of and hypotheses about people's cognitive processes" (Fischhoff, 1982) and how they might lead to a given bias. Along these lines, another group of researchers hypothesized that overclaiming credit results from focusing only on estimates of one's own contributions and ignoring those of others in a group. They found that requiring people to estimate not only their own contributions but also those of others reduces overclaiming (Savitsky, Van Boven, Epley, and Wight, 2005).

Another promising stream of research that examines how System 2 thinking can be leveraged to reduce System 1 errors has shown that analogical reasoning can be used to reduce bounds on people's awareness (see Bazerman and Chugh 2005 for more on bounded awareness). Building on the work of Thompson, Gentner, and Loewenstein (2000), both Idson, Chugh, Bereby-Meyer, Moran, Grosskopf, and Bazerman (2004) and Moran, Ritov, and Bazerman (2008) found that individuals who were encouraged to see and understand the common principle underlying a set of seemingly unrelated tasks subsequently demonstrated an improved ability to discover solutions in a different task that relied on the same underlying principle. This work is consistent with Thompson et al.'s (2000) observation that surface details of learning opportunities often distract us from seeing important underlying, generalizable principles. Analogical reasoning appears to offer hope for overcoming this barrier to decision improvement.

Work on joint-versus-separate decision making also suggests that people can move from suboptimal System 1 thinking toward improved System 2 thinking when they consider and choose between multiple options simultaneously rather than accepting or rejecting options separately. For example, Bazerman, White and Loewenstein (1995)

find evidence that people display more bounded self-interest (Jolls, Sunstein, and Thaler, 1998) – focusing on their outcomes *relative* to those of others rather than optimizing their own outcomes – when assessing one option at a time than when considering multiple options side by side. Bazerman, Loewenstein and White (1992) have also demonstrated that people exhibit less willpower when they weigh choices separately rather than jointly.

The research discussed above suggests that any change in a decision's context that promotes cool-headed System 2 thinking has the potential to reduce common biases resulting from hotheadedness, such as impulsivity and concern about relative outcomes. Research on joint-versus-separate decision making highlights the fact that our first impulses tend to be more emotional than logical (Moore and Loewenstein, 2004). Some additional suggestive results in this domain include the findings that willpower is weakened when people are placed under extreme cognitive load (Shiv and Fedorkihn, 1999) and when they are inexperienced in a choice domain (Milkman, Rogers and Bazerman, 2008). Other research has shown that people make less impulsive, sub-optimal decisions in many domains when they make choices further in advance of their consequences (see Milkman, Rogers and Bazerman, in press, for a review). A question we pose in light of this research is when and how carefully selected contextual changes promoting increased cognition can be leveraged to reduce the effects of decision making biases?

Another Important Question: Can We Leverage System 1 to Improve Decision Making?

Albert Einstein once said, "We can't solve problems by using the same kind of thinking we used when we created them." However, it is possible that the unconscious mental system can, in fact, do just that. In recent years, a new general strategy for

improving biased decision making has been proposed that leverages our automatic cognitive processes and turns them to our advantage (Sunstein and Thaler, 2003). Rather than trying to change a decision maker's thinking from System 1 to System 2 in situations where System 1 processing is known to frequently result in biased decisions, this strategy tries to change the environment so that System 1 thinking will lead to good results. This type of improvement strategy, which Thaler and Sunstein discuss at length in their book *Nudge* (2008), calls upon those who design situations in which choices are made (whether they be the decision makers themselves or other "choice architects") to maximize the odds that decision makers will make wise choices given known decision biases. For example, a bias towards inaction creates a preference for default options (Ritov and Baron, 1992). Choice architects can use this insight to improve decision making by ensuring that the available default is the option that is likely to be best for decision makers and/or society. Making 401k enrollment a default, for instance, has been shown to significantly increase employees' savings rates (Benartzi and Thaler, 2007).

There is also some suggestive evidence that leveraging System 1 thinking to improve System 1 choices may be particularly effective in the realm of decision-making biases that people do not like to admit or believe they are susceptible to. For instance, many of us are susceptible to implicit racial bias but feel uncomfortable acknowledging this fact, even to ourselves. Conscious efforts to simply "do better" on implicit bias tests are usually futile (Nosek, Greenwald, & Banaji, 2007). However, individuals whose mental or physical environment is shaped by the involvement of a black experimenter rather than a white experimenter show less implicit racial bias (Lowery, Hardin, & Sinclair, 2001; Blair, 2002). The results of this "change the environment" approach

contrast sharply with the failure of "try harder" solutions, which rely on conscious effort. In summary, can solutions to biases that people are unwilling to acknowledge be found in the same automatic systems that generate this class of problems?

Conclusion

People put great trust in their intuition. The past 50 years of decision-making research challenges that trust in a broad range of settings. A key task for psychologists is to identify how and in what situations people should try to move from intuitively compelling System 1 thinking to more deliberative System 2 thinking and to design situations that make System 1 thinking work in the decision-maker's favor. Clearly, minor decisions do not require a complete System 2 process or a new decision architecture. In addition, situations in which people are unlikely to be susceptible to decision biases or are likely to benefit from automatic processing are inappropriate for interventions to promote System 2 thinking or alter choice architecture. However, the more deeply we understand the biases that result from System 1 thinking in a wide range of situations, the more deeply we desire empirically tested strategies for reaching better decisions in those situations. Recent decades have delivered description in abundance. This paper calls for more research on strategies for improving decisions.

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