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Imperfect memory and choice under risk ☆

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ABSTRACT

This paper presents a model of choice based on imperfect memory and self-deception. I assume that people have preferences over their own attributes (e.g., skill, knowledge, or competence) and can manipulate their memories. The model provides a prior-dependent theory of regret aversion and allows for prior-dependent information attitudes. It implies that behavior will converge to the one predicted by expected utility theory after a choice has been faced a sufficiently large number of times.

1. Introduction

Choices with uncertain outcomes are an unavoidable part of a person's life. The outcomes often depend on the person's own attributes (e.g., skill, knowledge, or competence) and, therefore, influence the individual's self-views. Choices that turn out to be wrong typically lead to self-doubt, while choices that turn out to be right enhance the person's self-image. Hence, a person who cares about self-image will desire to manipulate recollections and beliefs. Indeed, there is abundant psychological evidence that people value a positive self-image and manipulate their memories (see Section 2).

This paper focuses on how the concern for self-image affects an individual's behavior under risk when memory is imperfect. I consider a model based on two basic premises: First, individuals have preferences over their own attributes; Second, they can influence what they will remember. Both assumptions are largely supported by psychological evidence. Apart from these two assumptions, individuals are assumed to behave as in standard economic models. Their preferences satisfy the axioms of expected utility theory. Furthermore, individuals follow Bayes' rule and, therefore, are aware of their memory imperfection. The model ties the concept of self-deception together with several deviations from standard expected utility theory, such as non-linear probability weights, risk aversion over lotteries with small stakes, regret aversion, and the competence hypothesis. It also generates endowment and sunk cost effects.

In its simplest version, the model consists of a two-period decision problem. In the first period, an individual observes the outcome of a signal, which is informative about her attributes. Then, she chooses the probability of forgetting the outcome of the signal. In the second period, the individual applies Bayes' rule to her recollection of the signal. Because

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Bayes' rule implies that, on average, the individual's interpretation of her recollections are correct, self-deception does not change her (ex-ante) expected self-views. Hence, from an ex-ante point of view, memory manipulation is wasteful and, therefore, the agent would prefer not to observe the realization of the signal. Nevertheless, after observing the signal, the individual has an incentive to manipulate her memory in order to improve her self-image.

The model generates a preference for avoiding information: people prefer not to acquire information if the expected benefit from making an informed decision is lower than the costs of self-deception. Because individuals anticipate these costs, they may prefer to make uninformed decisions if the objective value of information is sufficiently low. This result contrasts with Blackwell's celebrated theorem, which states that having additional information never hurts. It is consistent, however, with the large psychology literature that connects self-deception and information avoidance. For example, people often avoid health exams, especially if the value of information is not high enough (e.g. the disease is not easily treatable) and if being diagnosed with the disease significantly affects their self-image. Individuals also engage in "self-handicapping" strategies, such as under-preparing for an exam or getting too little sleep before physical exercise, in order to reduce the informational content of the signal. They may also have a "fear of competition," since outcomes from competitors are often informative about their own attributes.

The model formalizes the theory of regret aversion based on self-perception proposed by Josephs et al. (1992). According to this theory, individuals with low self-image are more likely to make choices that minimize the possibility of regret. The model is also consistent with behavior that Eliaz and Spiegler (2006) have shown to be inconsistent with models of "utility from beliefs."

When outcomes involve money, the individual may reject gambles with small but positive expected value unlike predicted by expected utility theory. The divergence from expected utility in my model is directly related to the decision maker's self-perceived attributes. This result is consistent with experimental evidence suggesting that deviations from expected utility theory are associated with the lotteries' being correlated with the decision maker's skill or knowledge.[1]

In a repeated setting in which the person observes a sequence of signals and manipulates her memory after observing of them, the attitude towards risk converges to the one implied by expected utility theory. This result is consistent with the arguments that people do not exhibit ambiguity aversion over events that have been observed several times and that experts may be subject to less bias than beginners (e.g. List, 2003; List and Haigh, 2005).

Two applications illustrate the theory. Successful trading usually requires certain skills or knowledge. At the very least, a potential buyer must form expectations about how much the good is worth. In more complex markets, future prices of the good must also be estimated. Thus, the outcome of the trade is informative about the person's skills or knowledge. Since decision makers avoid information correlated with skills or knowledge, they will accept to buy an object if the expected benefit exceeds a certain positive threshold. Therefore, self-deception generates an endowment effect.

The second application considers the influence of sunk decisions on behavior. In several contexts, revising one's decision usually involves admitting that a wrong decision was made and, therefore, it is often informative to the person about her own skills or knowledge. The model provides a self-deception explanation for the influence of sunk decisions on behavior that is consistent with arguments from the literature in psychology.

The structure of the paper is as follows. Section 2 briefly reviews the psychological evidence on the memory and the related literature in economics. Section 3 introduces and discusses the general framework. In Section 4, I describe the implications for information acquisition. Section 5 considers a repeated version of the model. Section 6 summarizes the main results and discusses possible extensions. In the appendix, I consider lotteries over money (Appendix A), and I present the two applications of the model (Appendix B).

2. Related literature

2.1. An overview of the psychology literature

> Ego-involvement, or its absence, makes a critical difference in human behavior. When a person reacts in a neutral, impersonal, routine atmosphere, his behavior is one thing. But when he is behaving personally, perhaps excitedly, seriously committed to a task, he behaves quite differently. In the first condition his ego is not engaged; in the second, it is. (Gordon W. Allport, 1943, p. 459).

Psychologists have largely documented a human tendency to deny or misrepresent reality to oneself (i.e., engage in self-deception). In general, people consider themselves to be "smart," "knowledgeable," and "nice." Information conflicting with this image is usually ignored or denied. Greenwald (1980, p. 605), for example, argued that "[o]ne of the best established recent findings in social psychology is that people perceive themselves readily as the origin of good effects and reluctantly as the origin of ill effects." Similarly, Gollwitzer et al. (1982, p. 702), claimed that the "asymmetrical attributions after success and failure" are a "firmly established finding."

People are also more likely to remember successes than failures (Korner, 1950). After choosing between two different options, they tend to recall the positive aspects of the chosen option and the negative aspects of the forgone option (Mather et al., 2003). Relatedly, individuals overestimate their achievements and readily find evidence that they possess attributes

[1] See, for example, Heath and Tversky (1991), Josephs et al. (1992), Fox and Tversky (1995), Goodie (2003), and Goodie and Young (2007).