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NEED SATISFACTION, INSTRUMENTAL RATIONALITY AND BIASED DECISION-MAKING

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Manuscript: Domeier, M., Sachse, P., & Schafer, B. (2018). Motivational Reasons for Biased Decisions: The Sunk-Cost Effect's Instrumental Rationality. Frontiers in Psychology, 9(MAY), 815.

The article *Motivational Reasons for Biased Decisions: The Sunk-Cost Effect's Instrumental Rationality* written by Markus Domeier, Pierre Sachse and Bernd Schafer was published in *Frontiers in Psychology* on May,2018. The main ideas of this article are: human beings demonstrate instrumental rationality when making decisions; the goal of instrumental rationality is need satisfaction instead of objective return maximization; and debiasing interventions foresting self-reflection cannot stop people from choosing the biased options for themselves. The significance of this article is: This finding contributed to the discussion on the reasons for cognitive biases and their formation in human mind. From Cognitive Science class, we know people make decisions based on subjective utility. After reading the article, we will have a deeper understanding on the mechanism of how the utility is related with need-satisfaction.

This essay will be organized in the following way. Section 1 summarizes the article mentioned above. Section 2 evaluates the article and links it to the theories from Cognitive Science class.

1 Summary

The authors first explicated some research background to reach the first question for discussion. They started with the fact that human behaviors in decision-making differ from the homo oeconomicus model. It led to the discussion on human rationality. The authors listed two main theories proposed by Cohen and Evans, respectively. The former argues we could not equal the inconsistency of human behavior and normative system behaviors to error, bias, or irrationality. The latter believes there are two types of rationality: the normative one which is related to a normative system and the instrumental one which is mainly for achieving personal goals. And decision bias can be explained as people following instrumental rationality rather than normative rationality. The authors agreed with the latter and they took one step closer to see which goals people follow when they demonstrate instrumental rationality (Question 1).

Authors then explained some basic concepts on motivation to reach the second question for discussion. Although the terms "bias" and "debiasing" are from the perspective of normative rationality, they would also use the terms to keep a connection with previous researches. Psi-theory is a systemic psychological architecture theory covering human cognitive system and action regulation. The authors focused on its motivational needs part. There are five needs human have: existence, species preserving, affiliation, certainty, and competence. In the article, authors focused on the need for competence.

They also adopted Dorner's view on need regulation. Human beings assess the external situation and rate it to an actual positive or negative degree. There is also a target degree in human mind. If the actual degree is a little lower than the target degree, a need becomes active. However, if the actual degree is far lower than the target degree, a displeasure signal is generated, and the process of need-regulation is initiated. Then people would probably transfer their behavior from goal-oriented (achieving an objective goal) behaviour into need-oriented (satisfying human needs) behaviour. The authors took an example to describe this situation. A student receives lots of frustrated signals in doing his/her work, and then he/she starts doing the dishes instead of persisting in working. Washing the dishes regulates the need for competence by creating a feeling of being effective in the short run.

Authors associated the theory of motivation with decision-making. Decision-making is a problem-solving process that an individual chooses an alternative at present for future requirements of an upcoming situation. The available alternatives are assessed both from the goal-reaching potential aspect and the need-satisfying potential aspect. It would happen that the individual unconsciously shifts his/her behavior from achieving the objective goal into satisfying his/her needs. The authors focused on the cases when maximizing objective return and satisfying needs cannot be achieved together. The second question they wanted to address was what role the unconscious need regulation play in the formation of the goals people follow when demonstrate instrumental rationality (Question 2).

The authors made use of the sunk-cost effect to find what rationality participants

follow. Sunk-cost is considered a cognitive bias. It means people persist with the option they have already invested in and resist turning to another option which might be more suitable for the task. Most of the studies on sunk-cost effect are in artificial scenarios, therefore, the authors wanted to design an experiment which could be close to real-life scenarios (Question 3). Question 3 was solved during the experiment design.

"Debiasing" interventions are measures to improve decision-making to achieve normative rationality. However, bias can also make the decision-maker aware of the different rationalities he/she might follow. Initializing self-reflection from an internal or external point of view is one of debiasing interventions. The fourth question authors wanted to address was whether an intervention can influence the rationalities that decision-makers follow or not (Question 4).

After the four questions were defined, the authors conducted their experiment design. Participants would choose between a sunk-cost option (SCO) and an alternative option (AO). These participants would be in two groups: the experimental group who receive an intervention and the control group who don't.

Then authors proposed their three hypotheses. First, biased decision (i.e. the SCO) is because of need regulation (Hypothesis 1). Second, SCO-selectors are with lower levels of self-reflection, achievement motives and self-control (Hypothesis 2). Third, a debiasing intervention initiating self-reflection process keeps decision-makers away from choosing the SCO (Hypothesis 3).

The experiment went as follows. At first, 106 participants were separated from each other and assigned to the experimental or control group randomly. Secondly, participants completed the Self-Control Scale (SCS-K-D) as well as the Self-Reflection and Insight Scale (SRIS). The Achievement Motives Scale (including hope of success and fear of failure) was used to identify the motives of participants. Thirdly, all participants were asked to work as a project leader and design packing solutions with a limited budget of 15 euros for protecting a raw egg which might drop from a height of 3 meters. Different prices of different materials were also given. The task should be finished in 30 minutes

and the participants could keep the remaining funds after buying the material if their solutions worked. Fourthly, after 30 minutes, the construction was over. Participants were informed another alternative construction available which had a larger probability to make the egg survive the drop than the average self-created one. The control group were just asked to decide which one they would choose while the experimental group received a debiasing intervention before their choice. That is, the experimental group had to consider a new project leader who had not worked on either of the solutions which option to choose. After making the decision for the leader, the experimental group then asked to make decisions for themselves. Fifthly, each participant rated Competence Satisfaction for the two options (his/her own solution and the alternative solution). Finally, for AO selectors, a generator with a half probability of winning was used to determine whether they could keep their remaining budget. For SCO selectors, their eggs would be dropped from 3m height and they could only keep their remaining budget if their eggs survived.

The experiment results are as follows.

First, Hypothesis 1 was checked to be true, and Question 1 was answered. For the Competence Satisfaction aspect, SCO-selectors rated SCO high (around 4) and AO very low (around 2) while AO-selectors rated SCO and AO similarly (both around 3). Since SCO-selectors rated SCO with higher Competence Satisfaction and AO-selectors rated AO with higher Competence Satisfaction, Question 1 was answered that participants followed an instrumental rationality during option choosing.

Second, Question 2 was answered. For the estimation of options' success probability, both SCO-selectors and AO-selectors rated AO with higher success probability than SCO. Based on this fact, the authors claimed participants choose the option which potentially maintained or boosted their feeling of competence rather than the option with maximum return. Question 2 was answered that SCO-selectors choose SCO since they felt the potential success and AO-selectors, felt they might fail to protect the egg, thus chose AO which gave them a higher chance of winning while also avoiding the potential signal of ineffectiveness from the failure of their own construction.

Third, Hypothesis 2 was checked to be false. Authors found there were no significant differences between the SCO-selectors and AO-selectors in the SRIS, the Self-Control Scale, or the Achievement Motives Scale.

Finally, Hypothesis 3 was checked to be false and Question 4 was answered. Although for the experiment group, when making decisions for the imagined new project leader, the majority (86.5%) participants chose the AO for he/she, when making decisions for themselves, the majority (87%) chose the SCO. If without debiasing interventions, for the control group, the majority (86.5%) chose the SCO. Question 4 was answered that a prior normative rational insight did not prevent participants from choosing the SCO.

Authors also analyzed the limitations and outlook of their work. They thought their work could be improve by 1). improving the intervention to satisfy needs; 2). examining whether there is a financial threshold; 3). analyzing other types of cognitive biases and the need-regulative function; 4). exploring more to see if need-regulation leads to the sunk-cost effect, the sunk-cost effect triggers the need-regulation, or both.

2 Evaluation

The research field of the article is decision-making, which is relevant to our everyday life. From the Cognitive Science classes, we know some basics on how cognitive scientists study decision-making. Decision making can be defined as the cognitive process of choosing between alternative possible actions. The research approaches to decision-making can be classified as normative approaches, or descriptive approaches. Normative ones attempt to establish ideal ways of deciding what will give the best decision possible. Descriptive ones aim to describe how decisions are actually taken as against how they should be made. The decision problems can be classified as single-attribute decision problems or multi-attribute decision problems. In the article mentioned above, it adopted the descriptive approach. The decision problem is multi-attributes. There are two attributes: the remaining budget and the egg's survival situation.

In the textbook, biased decision-making is explained as people dealing not with objective money values or indeed with objective probabilities but rather with subjective value (or utility) and subjective probabilities. In the article, biased decision-making is explained as people following instrumental rationality rather than normative rationality. To be more detailed, it is about how goals are formed in mind to satisfy needs in specific decision-making task when human beings are following the instrumental rationality.

The research question of the article is mainly causal. The most important conclusion of the article is that: people choose the option which potentially maintained or boosted their feeling of competence rather than the option with maximum return. It unveiled the motivational reason for biased decisions.

Now let's look at the experiment design. The participants are 40 men and 66 women with mean age 21.75 years old and 95% of them are psychology students. Those participants were divided randomly and almost equally into 2 groups: the experimental group and the control group. The underlying theoretical variable is debiasing intervention process. The experimental group received the intervention while the control group didn't. For the potential nuisance variables, maybe we can reconsider the success probability of the AO. Although pre-tests showed a 30% chance of winning when the participants' own constructions were used while the alternative construction was coded with a 50% chance of winning, it might not the case for a specific participant. When a specific participant makes his/her choice, he/she does not weigh the 30% chance with the 50% chance, instead, his/her chance of winning would be larger than 50%. Under this circumstance, the goal of maximizing the return and the satisfaction of need are not opposite, and we cannot say his/her choice (the SCO) is a result of need regulation.

The statistical analysis is ideal for the data. Authors analyzed mean, variance, and distribution of some important variables. The scale for Competence Satisfaction is from 1 to 5 with step length 0.5, and the scale for estimating the success probability is on a percentage scale. Both are practical and reasonable.

As for the hypotheses and results, Hypothesis 1 was checked to be true and Hypoth-

esis 2 and 3 were checked to be false. That is: 1). need regulation is positively linked to choosing the SCO; 2). SCO-selectors don't show lower levels of self-reflection, achievement motives and self-control; 3). interventions foresting self-reflection don't prevent decision-makers from choosing the SCO for themselves.

For the discussion of the article, authors mentioned that their finding directly violates the expectation of individual behaviour according to the homo oeconomicus model since participants rather chose the option which potentially maintained or boosted their feeling of competence. Since the authors also mentioned that this experiment was under the situations that need-satisfaction and return-maximization are not consistent, they might need more experiments to prove or check their conclusions under other situations.

The main strengths of the study are: 1). the experiment was designed to analyze participants' decisions in a more realistic sunk-cost scenario; 2). the research finding contributed to the discussion on the reasons for cognitive biases and their formation in human mind. The weakness of the study is: the result would be more convincing if there are more participants.

For follow-up research, for example, we can do research on whether there is a money threshold for people to transfer from the SCO into the AO. In this case, if the expected money is very high, will people still make decisions for satisfying their need of competence or perusing good money rewards.

References

[1] Domeier, M., Sachse, P., & SchaFer, B. (2018). Motivational Reasons for Biased Decisions: The Sunk-Cost Effect's Instrumental Rationality. Frontiers in Psychology, 9(MAY), 815.