IPsyO - Sample Question

Mapping Risk Perceptions in Dynamic Risk-Taking Environments

Decision making in everyday life, from smoking one or more cigarettes to riding a bike without a helmet, forces people to evaluate choice options with different amounts of risk. People's perceptions of the probabilities of different outcomes in such situations—that is, their risk perceptions—can be a key factor underlying risk-taking behavior. Indeed, the way people perceive risks has been found to be associated with risk-taking propensity across many different domains, people, and cultures.

Typically, though, this process and the role of risk perceptions in risk-taking propensity have been examined using descriptions of single-shot scenarios (e.g., “Betting a day's income at a high stake poker game” or “Consuming five or more servings of alcohol in a single evening”). Although these studies have helped identify the important role that risk perceptions play in people's self reports of engaging in risk taking activities, there remain several open issues: One aspect that is not well captured in these simplified vignettes is that actual risk-taking behaviors, such as navigating traffic or smoking cigarettes, are often repeated and dynamic. Moreover, decisions in these situations usually come with at least partial feedback about the outcomes of the decision, allowing people to learn and update their beliefs for future decisions of the same kind. It is thus essential to understand how these dynamic factors impact risk perceptions. For example, to what extent do early experiences of risk influence subsequent risk-taking behavior? And more generally, how closely do people's risk perceptions track the objective probabilities in dynamic choice environments?

To address these questions, we turned to laboratory-based gambling tasks. A key factor in these tasks is that they prompt respondents to make repeated risky decisions, often with feedback. Moreover, in some of these tasks, the probabilities of a gain or a loss change dynamically, as a function of how much risk has already been taken. Thus, these tasks provide a means to study risk. perceptions in dynamic but controlled choice environments. In the current study, we focused on the Balloon Analogue Risk Task (BART). We were particularly interested in how people's risk perceptions track objective risks in this dynamic choice environment, how these risk perceptions influence actual risk-taking behavior, and what role early experiences play in perceptions of risk.

During the BART, people are asked to pump up a balloon on a computer screen. With each successful pump, they earn a fixed payoff (e.g., 5 cents). Each balloon has an (initially unknown) maximum capacity, and pumping beyond this capacity results in an explosion of the balloon. Consequently, the accrued payoff of the current trial is lost. People, thus, have to decide when to stop pumping and collect their earnings before the balloon explodes. If they choose to stop and collect their earnings, the trial ends and the earnings are transferred to a permanent bank. Typically, people complete a series of 30 trials, and the average number of pumps on non-exploding balloons across all trials is used as a general risk-taking score known as the adjusted BART score.

The adjusted BART score has been found to correlate with real-world risky behaviors, including substance use and abuse, delinquency, risky traffic behavior, and sexual behaviors. One suggestion as to why performance in the BART correlates with these risky behaviors is that its underlying structure appears to mimic many real-world risks and thus entice people to take similar levels of risk in the laboratory tasks. Specifically, during the BART, the probability of a loss is initially small but grows with each pump, much like other risky actions such as smoking or substance abuse. Formally, the probability of a balloon exploding on pump opportunity i, given that it did not explode on the preceding pump opportunities, is

$$p = \frac{1}{n - i + 1}$$

where n is the number of maximum pumps that can be made (in most cases 128). That is, with a maximum of 128 pump opportunities, the probability that the balloon will explode on the first pump opportunity is 1/128. Given that it did not explode on the first pump opportunity, the probability of an explosion on the second pump opportunity is 1/127, on the third pump opportunity 1/126, and so forth up to pump opportunity 128, when the balloon would explode with certainty. Thus, with the probability of an explosion increasing with each pump, the BART creates, as Schonberg et al. stated, “a sense of escalating tension and exhilaration”.

Our results show that the probability ratings deviate both from the actual probabilities of an explosion and from those predicted by the most successful cognitive model of the BART. Yet the probability estimates correlated with the actual choice behavior. Moreover, we found that the very first experience in the BART was a critical factor in determining the perceptions of the risks in the task, and in turn subsequent risk-taking behavior. Taken together, the results help reveal the critical role that risk perceptions play in risky behavior and potentially can be used to improve our ability to identify real-world risk takers.

I. Multiple-Choice Question (30')

Please answer the following questions. For each question there are four possible answers A, B, C and D. Choose the one you consider correct. Each question is worth 2 points.

1. _____ will affect an individual's risk-taking behavior.
   A. Emotion
   B. Risk perceptions
   C. Cognitive level
   D. Personal experience

2. Which of the following factors affect(s) individual risk perception?
   A. Cultural difference
   B. Regional differences
   C. Risk-taking tendencies
   D. All of the above

3. Which of the following belongs to a risk decision?
   A. Do you want to travel to Beijing?
   B. Do you want to smoke?
   C. Breaking the law is 100% punishable.
   D. If you go to work by bike, you are 50% likely to be late; If drive to work, you have a 10% chance of being late.

4. Why should the subjects make repeated decisions in the gambling task of the laboratory?
   A. To reduce errors
   B. To improve accuracy
   C. To prevent accidental errors
   D. All of the above

5. What factors affect the probability of gain or loss in laboratory-based gambling tasks?
   A. Size of risk taken
   B. Individual gender
   C. Individual age
   D. Individual race

6. The research method used in the BART is _____.
   A. observational method
   B. survey method
   C. experimental method
   D. interviewing method

7. The dependent variable in the BART study is _____.
   A. personal experience
   B. experimental reward
   C. BART score
   D. None of the above

8. What does the adjusted BART score reflect?
   A. Individual risk perception level
   B. Individual early experience
   C. Individual greed
   D. Individual risk level

9. What can we infer from the BART study?
   A. Risk perception has an impact on individual behavior.
   B. Risk behavior cannot be controlled by an individual.
   C. Early experience has no impact on individual behavior.
   D. All of the above.

10. If you want to verify the impact of the BART score on individual behavior, which data test method should be used?
   A. T / F inspection
   B. Z test
   C. Chi-square test
   D. Correlation analysis

11. Which of the following does NOT belong to the relevant analysis?
   A. Kendall correlation
   B. Product difference correlation
   C. Pearson correlation
   D. Variance correlation

12. According to the BART study, what is the relationship between the probability of loss and risk?
    A. Positive correlation
    B. Negative correlation
    C. Curve correlation
    D. Zero correlation

13. Assuming that the maximum pumping opportunity is 60 times, what is the probability that the balloon will explode at the second pumping?
    A. 1/60
    B. 1/59
    C. 1/58
    D. 1/57

14. Which of the following is NOT a component of a risk decision?
    A. Many options
    B. Probability of each choice
    C. Quality of options
    D. None of the above

15. What is/are the possible implication(s) of this study?
    A. From a theoretical point of view, it helps to reveal the key role of risk cognition in risk behavior.
    B. From a practical point of view, it can help us improve our ability to identify real-world risk-takers.
    C. From the perspective of practical application, it can be used to explain individual risk-taking behavior, such as gambling behavior.
    D. All of the above.

II. Free-Response Question (70')

16. Answer the following questions based on the material you learned.

    (1) Explain what risk decision-making is. (4 points)

    (2) Summarize the conclusions of the BART study. (6 points)

(3) What areas can risk decision-making be applied? (5 points)

(4) What problems can risk decision-making help to solve? (5 points)

17. Here is a practical example of risk decision-making: the success rate of surgery is 83%, and the failure of surgery is fatal.

(1) Combined with the content of the article, please point out what are the elements of risk decision-making in this example? (8 points)

(2) What are the probabilities of different choices in this example? (6 points)

(3) Give other examples of risk decision-making in daily life. (6 points)

18. According to the study introduced in the material and the following requirements, you are expected to:

(1) Design an experimental scheme about risk decision-making, and list the experimental topic, experimental hypothesis, experimental object, experimental variables, experimental materials, experimental process, and expected results. (14 points)

(2) Evaluate the scheme from the following perspectives: What shortcomings does this experiment have? What can be improved? What is the significance of designing this experiment? (16 points)