



The effects of relative gains and losses on probabilistic choice in rats



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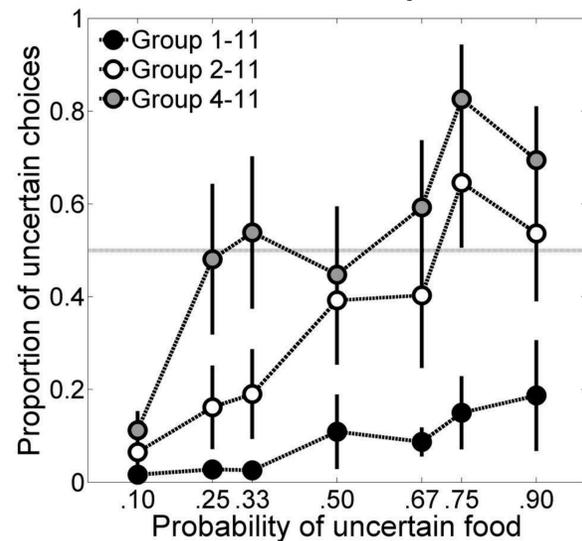
INTRODUCTION

- **Probability Discounting:** Decreased subjective value as reward probability decreases ¹
- Previous outcomes have been shown to influence subsequent choices ²
 - Win-Stay: Tendency to make the same choice if previous choice was a win
 - Lose-Shift: Tendency to make a different choice if previous choice was a loss
- Wins and losses are categorized relative to a particular reference point ³
 - Three possible reference points: Zero-based, Uncertain-choice-based, Certain-choice-based
- Goal of the study was to determine reference point use in rats

EXPERIMENT 1 – METHODS & RESULTS

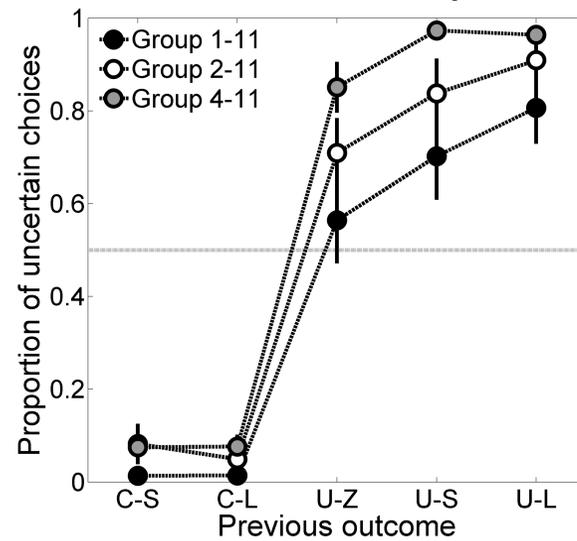
- 24 male Sprague-Dawley rats
- Trained to choose between a certain choice (2 or 4 pellets) and an uncertain choice (1 or 11 pellets, 2 or 11 pellets, 4 or 11 pellets)
- Probability of uncertain food varied across phases
 - .10, .25, .33, .50, .67, .75, .90

Molar Analysis



- Preference for the uncertain outcome increased as the probability of uncertain food increased
- Group 1-11 had a tendency to prefer the certain outcome regardless of uncertain reward probability

Molecular Analysis

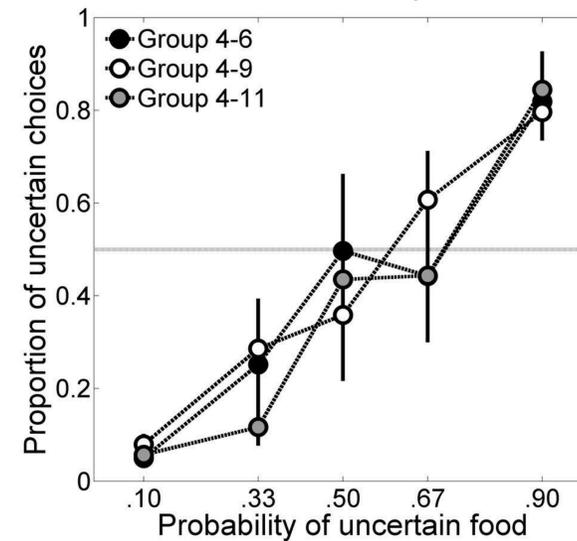


- Preference for side was influenced by previous outcome
 - Stay on certain side after certain reward
 - Stay on uncertain side after uncertain reward
 - Less likely to choose uncertain side following uncertain-zero reward
 - Increased preference for uncertain side as uncertain-small reward increased

EXPERIMENT 2 – METHODS & RESULTS

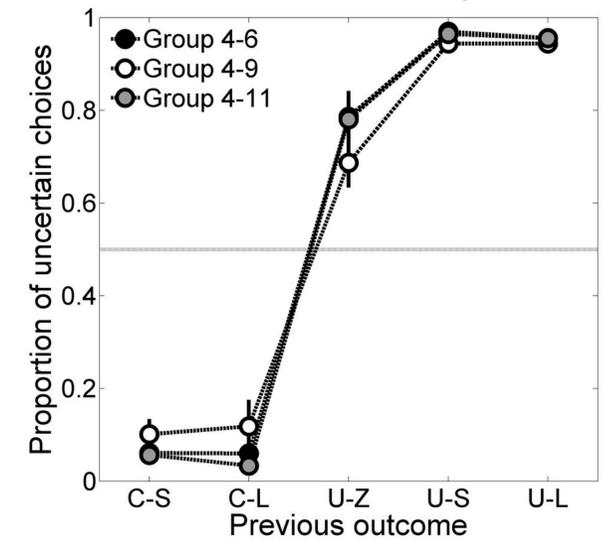
- 24 male Sprague-Dawley rats
- Trained to choose between a certain choice (2 or 4 pellets) and an uncertain choice (4 or 6 pellets, 4 or 9 pellets, 4 or 11 pellets)
- Probability of uncertain food varied across phases
 - .10, .33, .50, .67, .90

Molar Analysis



- Preference for the uncertain outcome increased as the probability of uncertain food increased
- No significant differences between the groups

Molecular Analysis



- Preference for side was influenced by previous outcome
 - Stay on certain side after certain reward
 - Stay on uncertain side after uncertain reward
 - Less likely to choose uncertain side following uncertain-zero reward

DISCUSSION

- When the uncertain reward is greater than expected value of the certain reward, reward magnitude does not have a considerable effect on choice
- Support for Certain-choice-based reference point
 - Difference in uncertain choices after U-S and U-L outcomes in Groups 1-11 and 2-11, but not in 4-11 (Expt. 1)
 - Lack of differences in uncertain choices after U-S and U-L outcomes (Expt. 2)
- Understanding the mechanisms of decision-making will help us become better aware of the aspects of repeated risky decision-making behaviors

REFERENCES

1. Rachlin, H., Raineri, A., & Cross, D. (1991). Subjective probability and delay. *Journal of the Experimental Analysis of Behavior*, 55(2), 233-244
2. Marshall, A.T. & Kirkpatrick, K. (2013). The effects of the previous outcome on probabilistic choice in rats. *Journal of Experimental Psychology: Animal Behavior Processes*, 39, 24-38.
3. Kahneman, D. & Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica*, 47, 263-291.