

# Overweighting of Small Probabilities in Real Effort Tasks

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## ABSTRACT

Overweighting of small probabilities (OSP) is a key tenant of Prospect Theory and has been demonstrated in choice tasks, whereas effort tasks have failed to replicate this phenomenon. An 8-arm, incentive-compatible, pre-registered study (N=1630) tested the boundaries of OSP in choice and effort. Participants preferred a 1% chance of \$1.00 over \$0.01 in choice, but the certain outcome motivated higher performance in effort.

## INTRODUCTION

### • Overweighting of Small Probabilities (OSP)

- **Choice:** Dozens of studies have demonstrated OSP in choice tasks (e.g., Abdellaoui, 2000; Tversky & Kahneman, 1992). In addition, OSP has been used to explain other phenomena such as the favorite long shot bias, and equity premium puzzle (Barberis, 2013).
- **Effort:** No studies have conclusively demonstrated whether or not OSP occurs in effort tasks. A few studies have compared effort motivated by a lottery incentive vs an expected value (EV) matched certain incentive (e.g., DellaVigna & Pope, 2017; Halpern et al., 2011)

### • Present work

- Within one study, we test whether people choose the lottery in choice but work harder for an EV matched certain incentive.

### Research Aim

Test whether people show risk seeking preferences in choice but not in effort, try to demonstrate that this is due to OSP in choice but not in effort, and evaluate alternative mechanisms that might explain this phenomenon.

## METHODS

- N = 1630 MTurk workers
- Lottery: 1% chance of receiving \$1. Certain: \$0.01.
- Conditions:

- Condition 1: One-Shot Choice
- Condition 2: One-Shot No Incentive
- Condition 3: One-Shot Certain Incentive
- Condition 4: One-Shot Lottery Incentive
- Condition 5: Repeated Choice
- Condition 6: Repeated No Incentive
- Condition 7: Repeated Certain Incentive
- Condition 8: Repeated Lottery Incentive

## PREDICTIONS AND TASK

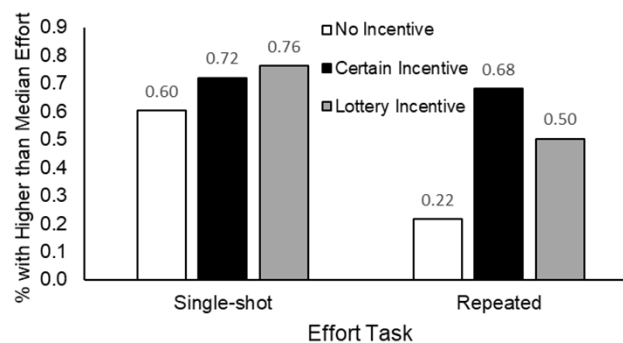
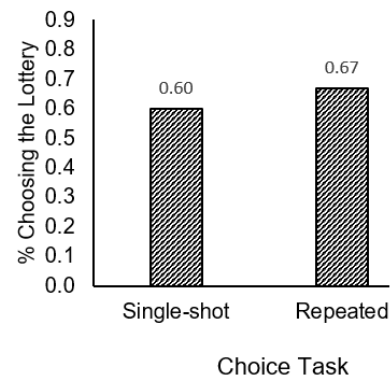
**Expected Results** Participants will choose the lottery over the certain incentive but work harder for the certain incentive.

### Task

Copy a 30-character string. In one-shot, the task was to complete 7. In repeated, participants repeated up to 200 encryptions one at a time.

SyNaH Ezb63 8bjMA pRQPh R4Wym XvWjy

## RESULTS



## RESULTS

### • One-Shot

- Majority choice: for lottery,  $p=.005$ .
- The certain and lottery conditions were not significantly different from each other ( $p = 0.41$ ) but both were significantly higher than the no incentive condition ( $ps < 0.01$ ).

### • Repeated

- Majority choice for lottery,  $p=.000$ .
- No incentive: mean 3.45 repetitions.
- Certain: mean 11.10 repetitions.
- Lottery: mean 7.20 repetitions.
- The certain condition performed better than the lottery condition ( $p < 0.01$ ) and both performed better than the no incentive condition ( $ps < 0.01$ ).

### • Combined

- Median-split all DVs.
- Logit regression on type of task and incentive
- 2 (task: choice vs. effort) x 2 (incentive: certain vs. lottery) interaction: OR = 2.66, 95% CI: [1.45, 4.89],  $p = 0.02$ .

## NEXT STEPS

### • Replicate the result in the field

- We will replicate the experiment presented in a field setting. Participants will walk laps for certain or lottery incentives.

### • Explore potential explanations & mechanisms.

- Participants may be indifferent between the lottery and certain incentive with a choice tie-breaking rule that favors the lottery.
- Participants may have task-specific utility functions such that the utility function for effort is concave but that for choice is convex.
- The choice and effort tasks differ in: use of feedback, static vs dynamic decision making, joint vs separate evaluation, autonomy over risk experienced.

## REFERENCES

- Abdellaoui, M. (2000). Parameter-Free Elicitation of Utility and Probability Weighting Functions. *Management Science*, 46(11), 1497-1512.
- Barberis, N. (2013). The Psychology of Tail Events: Progress and Challenges. *The American Economic Review*, 103(3), 611-616.
- DellaVigna, S., & Pope, D. (2017). What Motivates Effort? Evidence and Expert Forecasts. *The Review of Economic Studies*, 85(2), 1029-1069.
- Halpern, S. D., Kohn, R., Dornbrand-Lo, A., Metkus, T., Asch, D. A., & Volpp, K. G. (2011). Lottery-based versus fixed incentives to increase clinicians' response to surveys. *Health Services Research*, 46(5), 1663-1674.
- Tversky, A., & Kahneman, D. (1992). Advances in Prospect-Theory - Cumulative Representation of Uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297-323.