

Improving at Chance: Bias in Predicting Unpredictable Outcomes

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Introduction

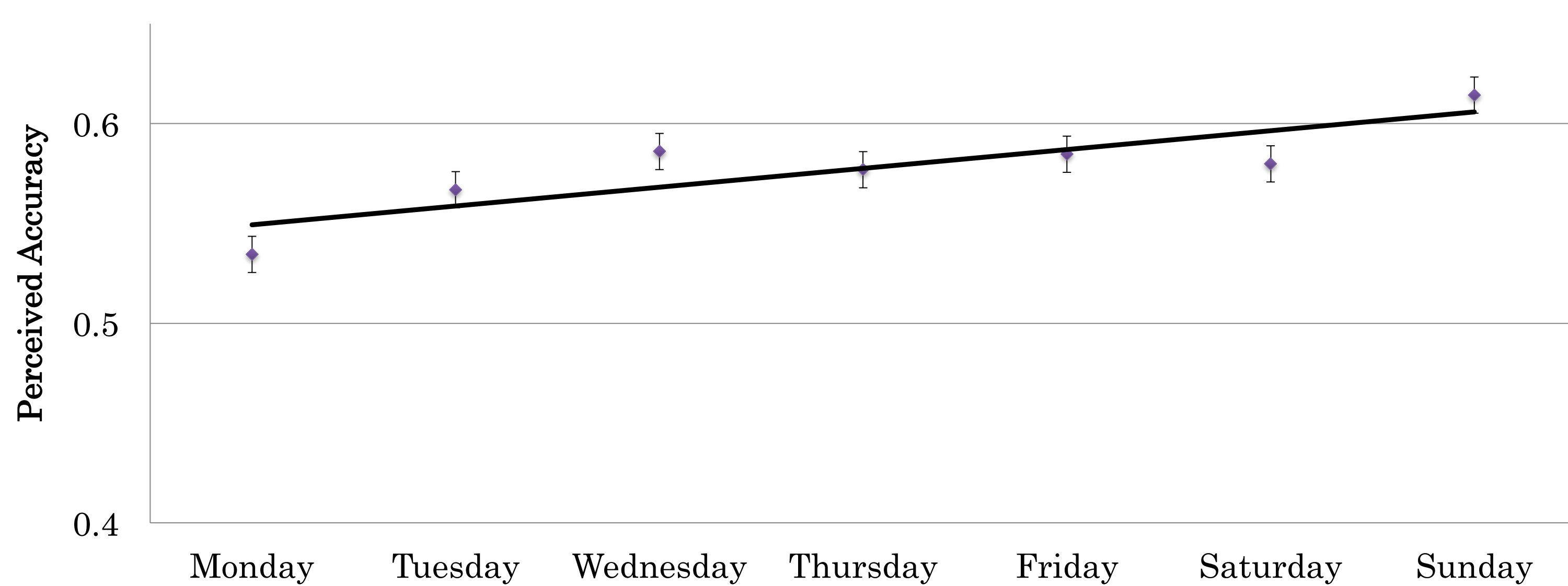
How do people make decisions about the future? We know that people choose very different event outcomes for near and distant future events, since these events are construed differentially over time¹. For example, people are more likely to attend a family rendezvous when it is set in the distant future than the near future, like later this week². Similarly, people are more likely to choose less healthful behaviors, like consuming junk food or drinking in excess, in the present, but not in the future³. Temporal placement of these events determines whether or not people partake. But, what about objective event outcomes? Coin flips cannot be predicted more accurately than chance, but are these event outcomes construed differently in the future? These 4 experiments examine perceived improvement at chance over time and exhibit participants' increased confidence in their chance predictions over time. Experiment 1 establishes participants' perceived improvement at chance predictions. Experiments 2 and 3 control for task demands and optimism. Experiment 4 tests the boundaries of the temporal duration at which this bias can still exist.

Experiment 1: Days of the Week

The purpose of Experiment 1 is to test whether people believe that coin flips can be predicted more accurately over time. 71 participants indicated how many, out of 5 coin flips, they believed they would guess correctly, daily, for a hypothetical week. Money was used as a DV as a proxy for successful guesses. In this task you are asked to predict the outcomes of five coin flips. You are asked to write down your predictions for all five coin flips all at once. Then the experimenter will flip the coin 5 times. For each coin flip that you accurately predicted, you will be given \$5. For each coin flip you inaccurately predicted, you will be given \$0.

How much money do you think you will make in this task on Monday?

Experiment 1: Days of the Week

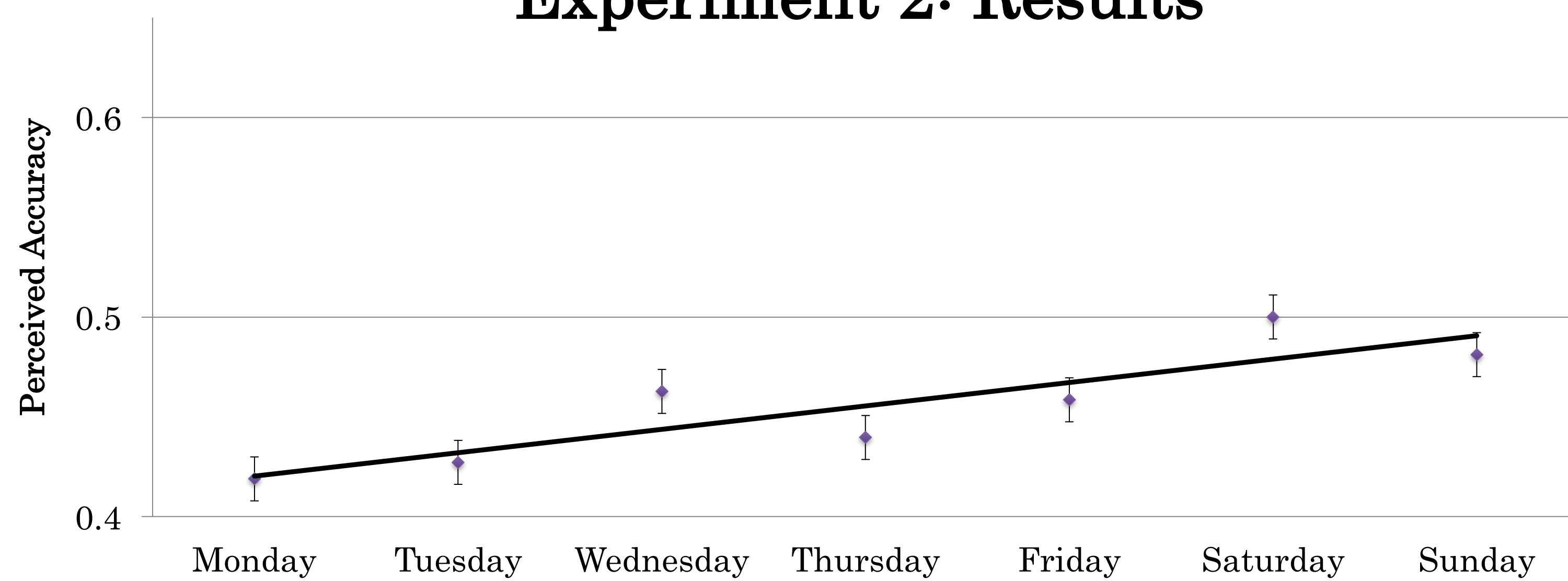


The results show a main effect of day of the week $F(1, 169)=5.783, p=.018$, although this effect is more fruitfully characterized by its correlation: participants show an increase in their perceived accuracy at predicting coin flip outcomes over the course of the week $t(173)=2.36, p=.019, r=.18$.

Experiment 2: Exploration of Task Demands

Experiment 1 showed that people believe that they will become increasingly better at predicting coin flips over time. One explanation for such an effect may be due to task demands: since participants were asked to complete the questionnaire for each day of the week in chronological order, they may have been linearly increasing their perceived ability. The purpose of Experiment 2 is to test whether the effect found in Experiment 1 was due to such task demands or to sensitivity of the passage of time. 96 participants on Mturk answered the same questions as Experiment 1, with days of the week randomized. Any increase over the days of the week in Experiment 2 would indicate that participants are sensitive to the passage of time in the experiment, rather than task demands of the question.

Experiment 2: Results



The data replicate Experiment 1 with both a main effect of day of the week ($F(1, 647)=12.87, p<.001$), and a positive correlation ($t(649)=3.59, p<.001, r=.14$), indicating participants believe their ability to correctly predict coin flips will increase over days of the week. This supports that the effects found in Experiment 1 cannot be due to task demands alone.

Experiment 3: Months of the Year

Exps. 1 and 2 found that participants believe their prediction accuracy for coin flip outcomes increases over days of the week, regardless of question order. Experiment 3 intends to test whether this effect is due to general optimism for future events. Half of participants (72) were asked to make predictions for the coin flip, and the other half (72) were not. Both groups were then asked how the same question as in Exp 1. Additionally, months, not days, was the time course for this experiment, to test whether the effect persists in longer time spans.

Agency Condition

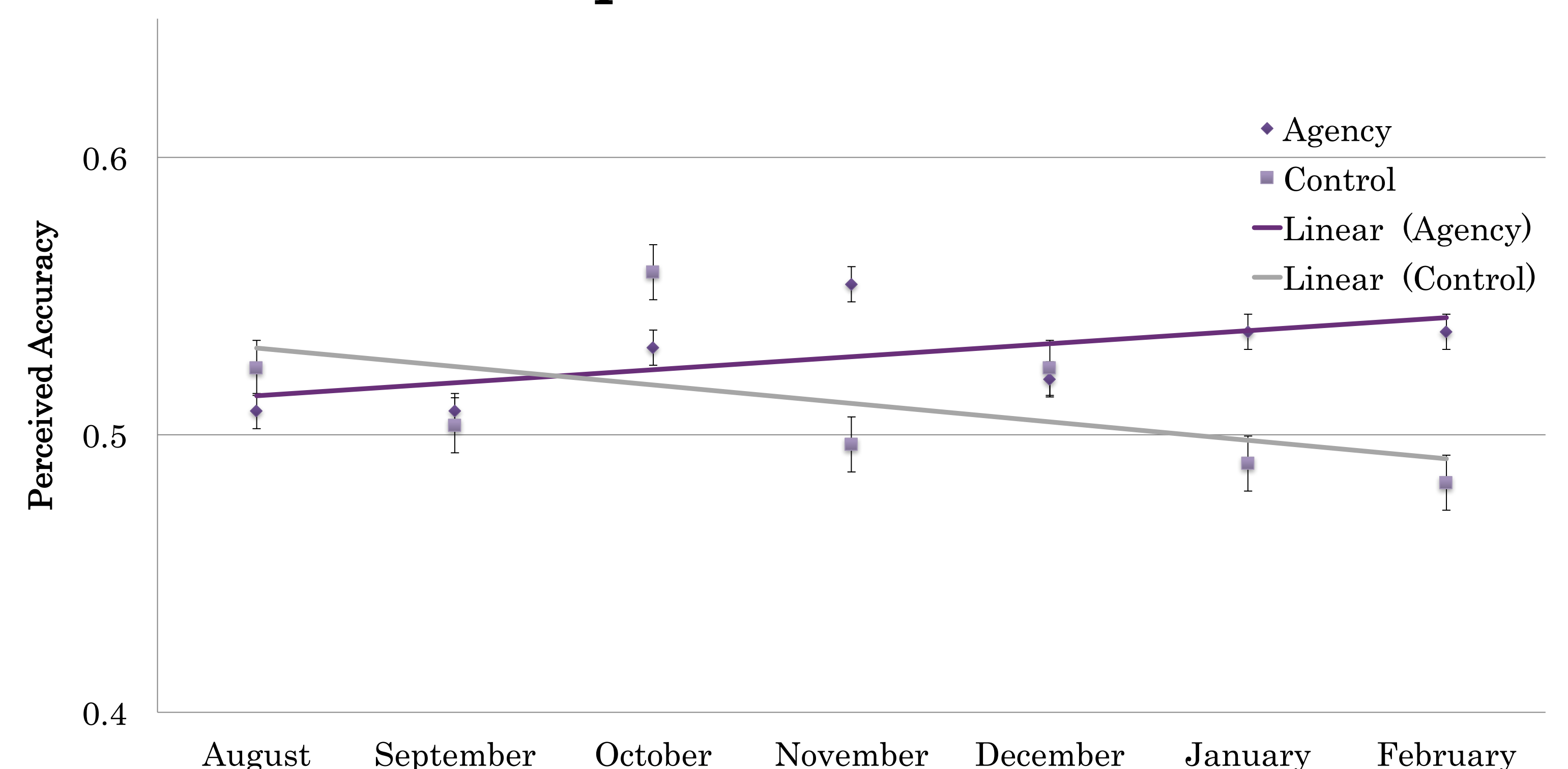
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Control Condition

In this task you will make no predictions. You are told that each time the coin lands on H, you will be paid \$5. The experimenter will flip the coin 5 times. This means that if the coin lands on H all five times, you will be given \$25. If the coin lands on T all five times, you will be given \$0.

How much money do you think you will make in this task in February?

Experiment 3: Results

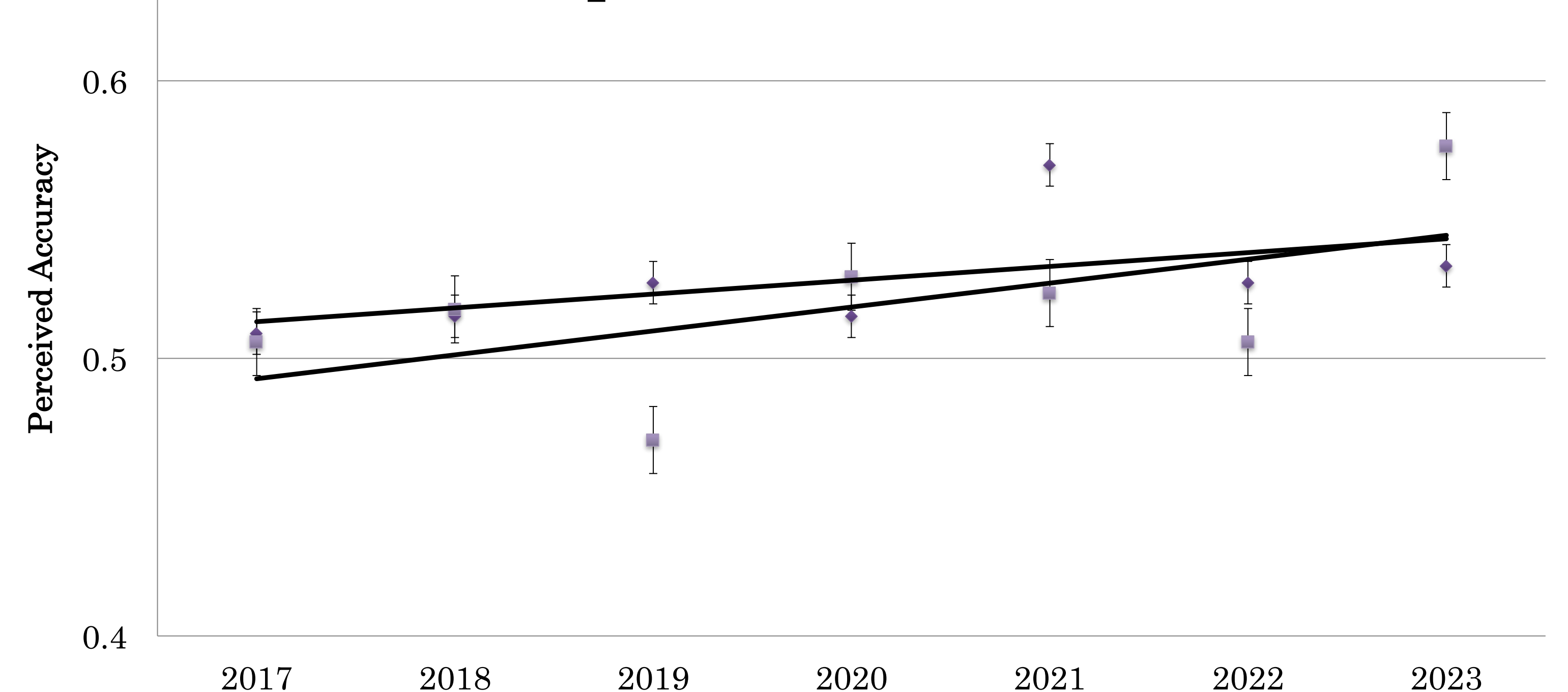


The results reveal an interaction of month by task: participants in the agency condition show increased perceived accuracy over time, while those in the control condition show a decrease over time $F(1, 896)= 5.049, p=0.02$. This indicates the optimism alone cannot be driving these effects.

Experiment 4: Years

Experiments 1 and 2 showed increased perceived abilities in predicting coin flip outcomes, and Experiment 3 indicated that this effect occurs over greater durations. Additionally, agency, choosing the outcome, affected perceived accuracy over time. Finally, Experiment 4 will employ even longer durations, years, to test whether agency can affect decisions made over such long time spans. 147 participants on Mturk answered the same questions as Experiment 3, where months were changed to years.

Experiment 4: Results



There are no significant effects, of neither agency nor time. This indicates a cut off point: the effects of time and agency disappear after extended durations.

Discussion

The purpose of this study was to understand how time and agency affect future decisions about unpredictable outcomes. Participants showed increased perceived ability in prediction accuracy across the days of the week (Experiments 1 and 2), and even months of the year (Experiment 3). The effect persisted in these conditions even when controlling for task demands (Experiment 2) and optimism (Experiment 3). However, these effects do not reliably extend into years. Taken together, these data show that people believe that unpredictable outcomes may become more predictable in the future, and that they have the power to predict them.

References

- 1 Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology, 75*(1), 5-35-43.
- 2 Eyal, T., Sagristano, M. D., Trope, Y., Liberman, N., & Chaiken, S. (2009). When values matter: Expressing values in behavioral intentions for the near vs. distant future. *Journal of Experimental Social Psychology, 45*(1), <https://doi.org/10.1016/j.jesp.2008.07.023>
- 3 Critchfield, T. S., & Kollins, S. H. (2001). Temporal discounting: Basic research and the analysis of socially important behavior. *Journal of applied behavior analysis, 34*(1), 101-122.

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