

Neither Threat of Shock nor Acute Psychosocial Stress Affect Ambiguity Aversion



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Introduction

- Economists differentiate uncertainty into two classes (Ellsberg, 1961): risk, which has known probabilistic outcomes and ambiguity, which has unknown probabilistic outcomes.
- It has been shown that a transient sympathetic arousal response to a choice predicts ambiguous but not risky decisions (FeldmanHall et al., 2016) and that activation of the amygdala is uniquely observed to ambiguous choices (Levy et al., 2010).

Hypothesis:

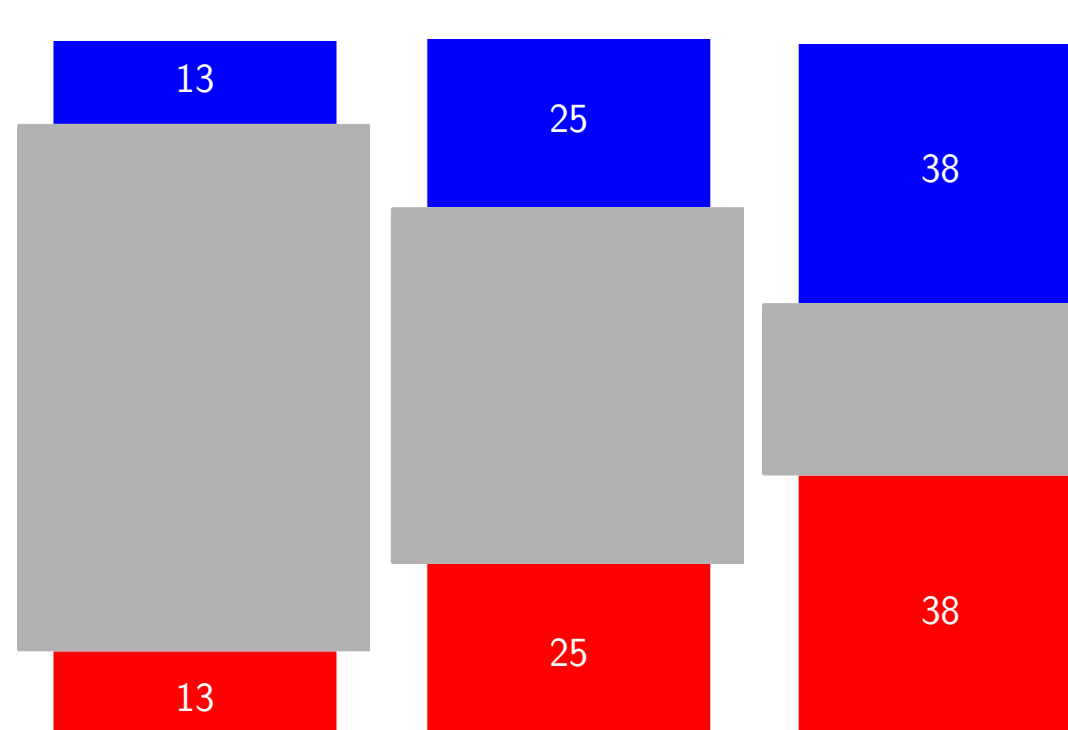
Inducing a physiological arousal incidental to the choice will alter ambiguity but not risk preferences.

Methods

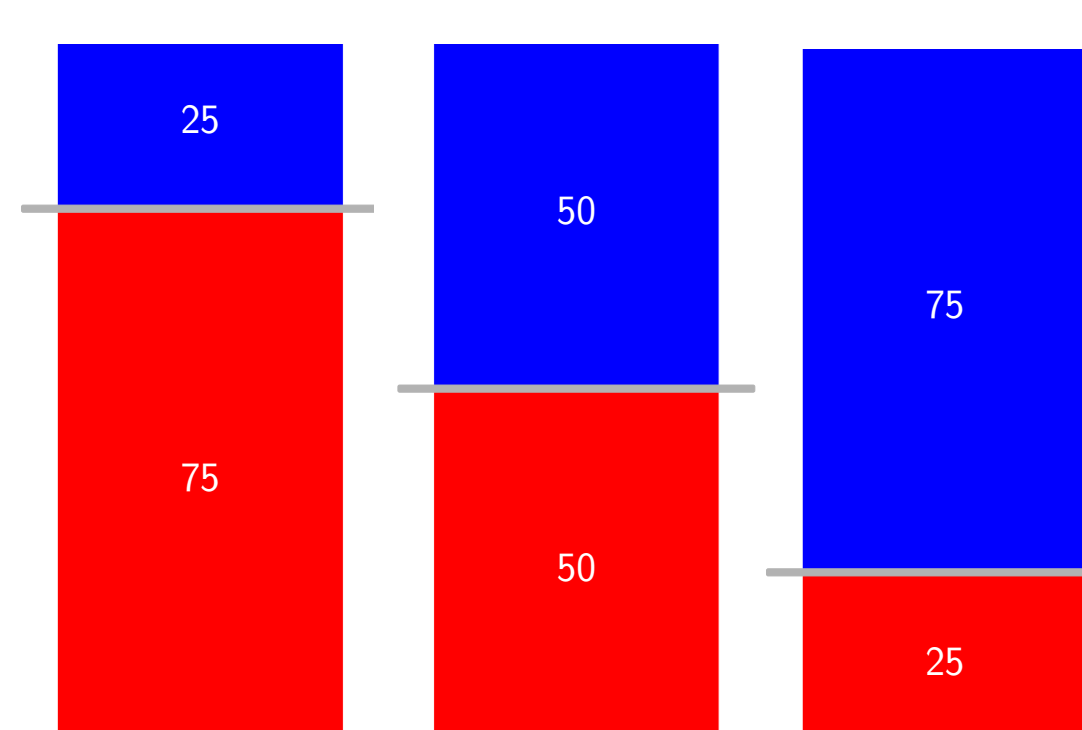
Participant Choice

- On each trial participants must decide between a guaranteed \$5 or to play the lottery to potentially earn more money. Lotteries amounts ranged from \$5 - \$66 for winning and \$0 for losing the lottery (see lotteries below).

Ambiguous Urns



Risky Urns



$$SV(p, A, v) = \left(p - \beta \frac{A}{2} \right) \times v^\alpha$$

Computational Model

- We implemented a computational model for the subjective value for each lottery with individual specific ambiguity (β) and risk (α) attitudes terms.

Methods

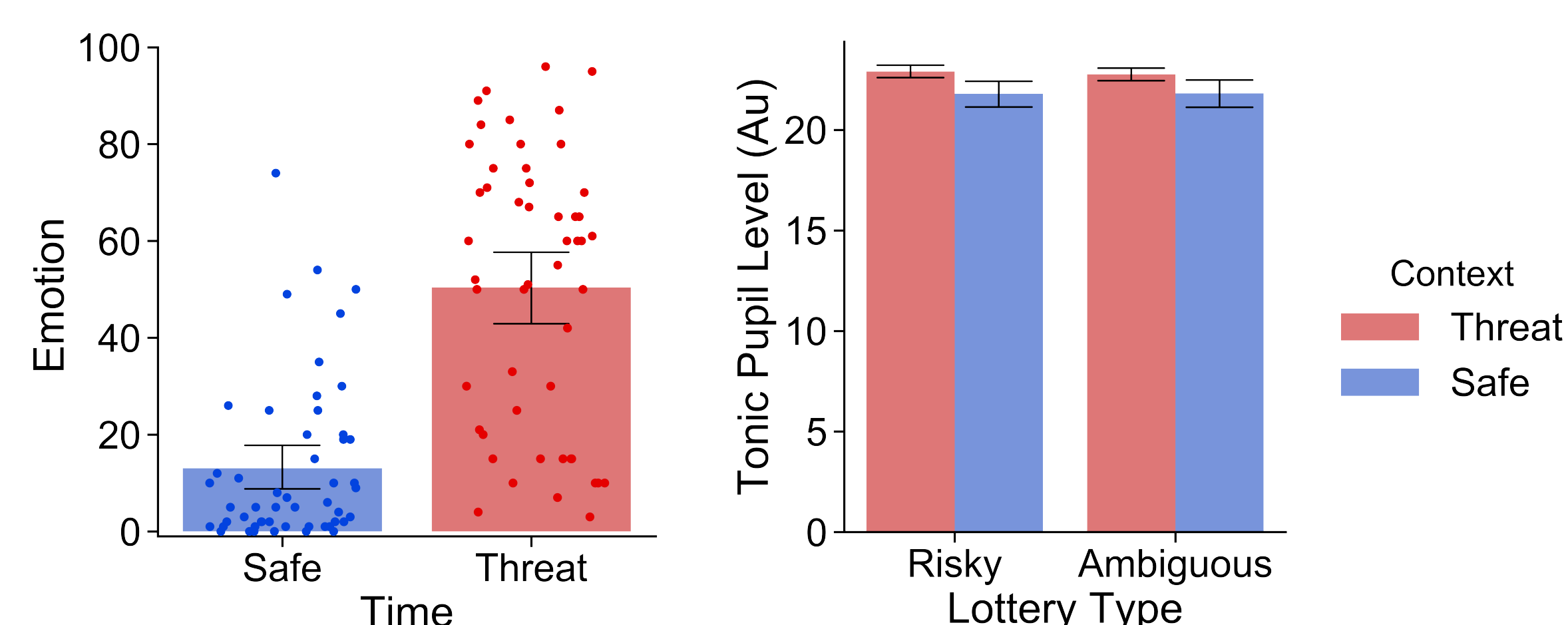
Threat of Shock (ToS)

- Fifty-seven participants were recruited to play a lottery task in a within-subjects design. In alternating blocks, participants were either safe or under threat of shock.

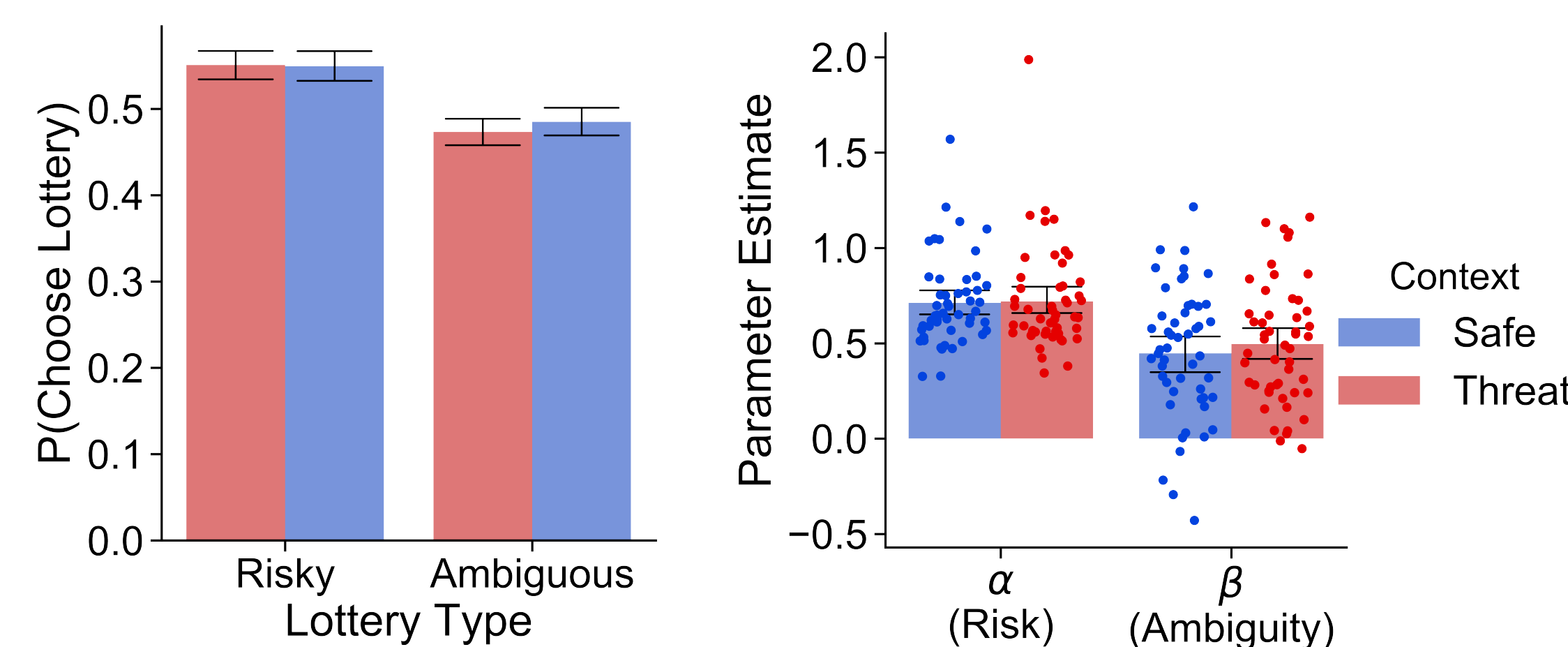
Trier Social Stress Test (TSST)

- Fifty-four participants were recruited to play the same lottery task in a between-subjects design. Participants were either under stress with the Trier Social Stress Test or a corresponding control removing stressful elements.

Results: ToS

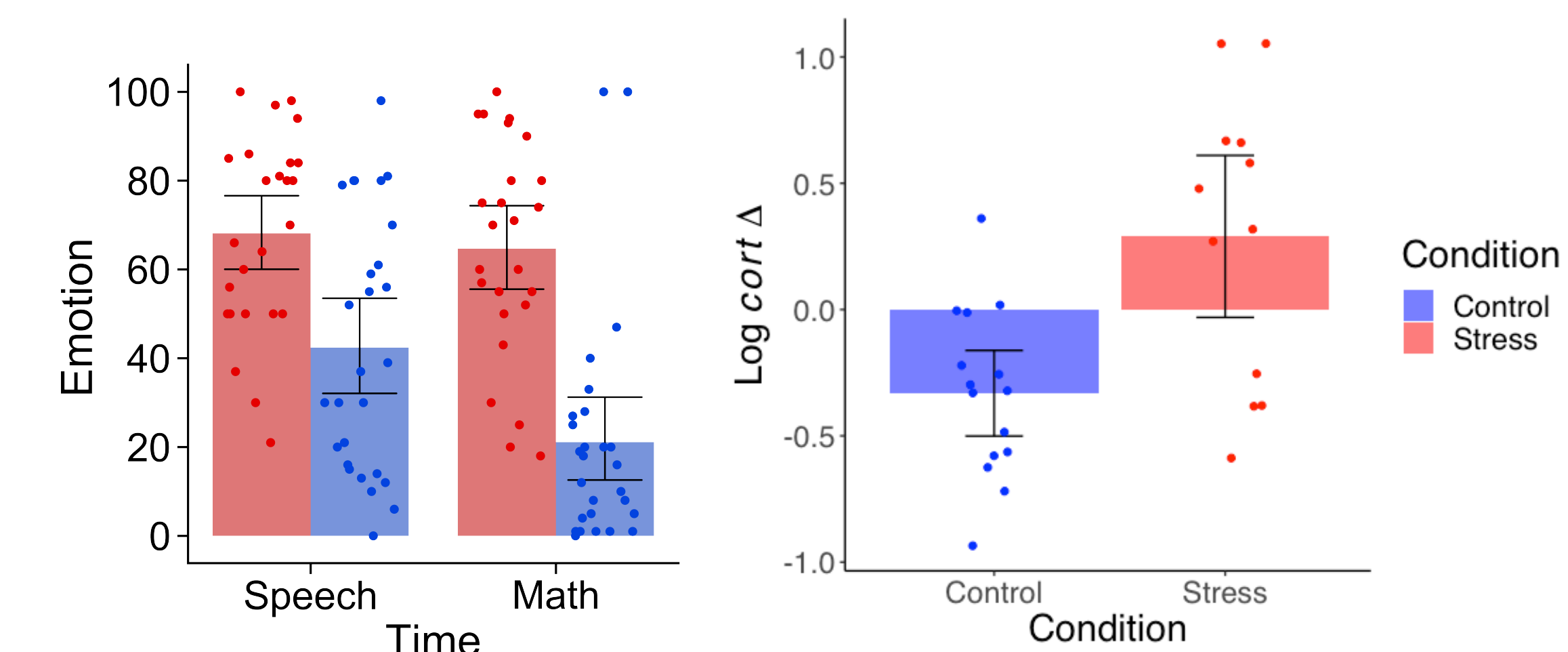


- The manipulation was successful as indicated by baseline (pre-trial) pupil dilation being significantly higher in the threat context compared to the safe context. Physiological data was verified with participants subjective ratings.

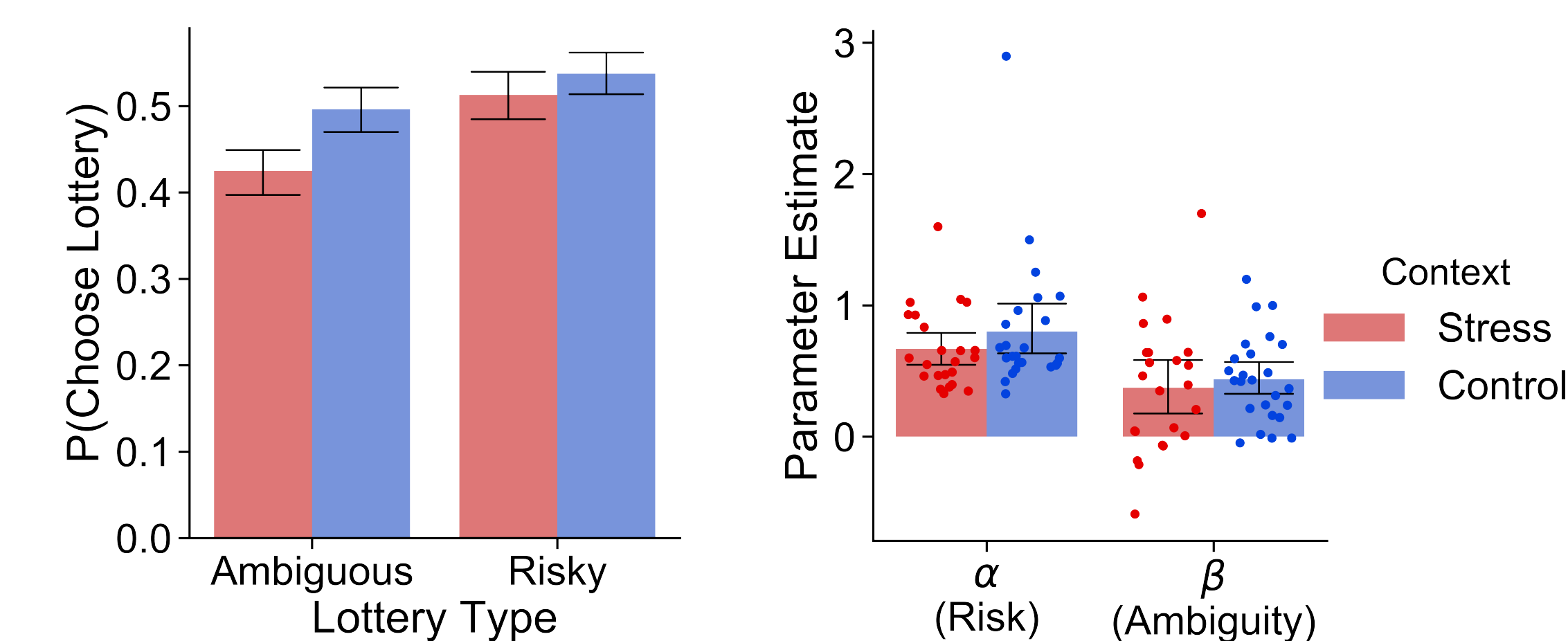


- As expected, our participants showed evidence of both ambiguity and risk aversion. However, in contrast to our hypothesis, threat of shock did not affect either ambiguity attitude.

Results: TSST



- Free salivary cortisol indicated that the manipulation was successful. Again, physiological data was consistent with participants self reported stress levels.



- Similar to the threat of shock paradigm, our participants were averse to both risk and ambiguity; however, their uncertainty preferences were unaffected by the stress manipulation.

Conclusions

- Consistent with previous research, we found that people were both ambiguity and risk averse. However, they were relatively more averse to ambiguity compare to risk.
- These findings indicate that physiological arousal incidental to the choice does not affect ambiguity or risk preferences.

References

- Ellsberg, D. (1961). Risk, Ambiguity, and the Savage Axioms. *The Quarterly Journal of Economics*, 75(4), 643-669.
- Levy, I., Snell, J., Nelson, A. J., Rustichini, A., & Glimcher, P. W. (2010). Neural representation of subjective value under risk and ambiguity. *Journal of neurophysiology*, 103(2), 1036-1047.
- FeldmanHall, O., Glimcher, P., Baker, A. L., & Phelps, E. A. (2016). Emotion and decision-making under uncertainty: Physiological arousal predicts increased gambling during ambiguity but not risk. *Journal of Experimental Psychology: General*, 145(10), 1255.

