

Choice increases curiosity in a lottery task

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BACKGROUND

Curiosity is pervasive in our lives. We spend significant time and effort seeking and consuming information. ¹⁻³

Our time and resources are limited, hence information selection is inevitable.

Often we choose which information we seek, but on occasion the selection is made for us.

Choice boosts subjective value of chosen options. ⁴⁻⁶

How does **choice** affect curiosity? - Independent of initial **preference**

DESIGN

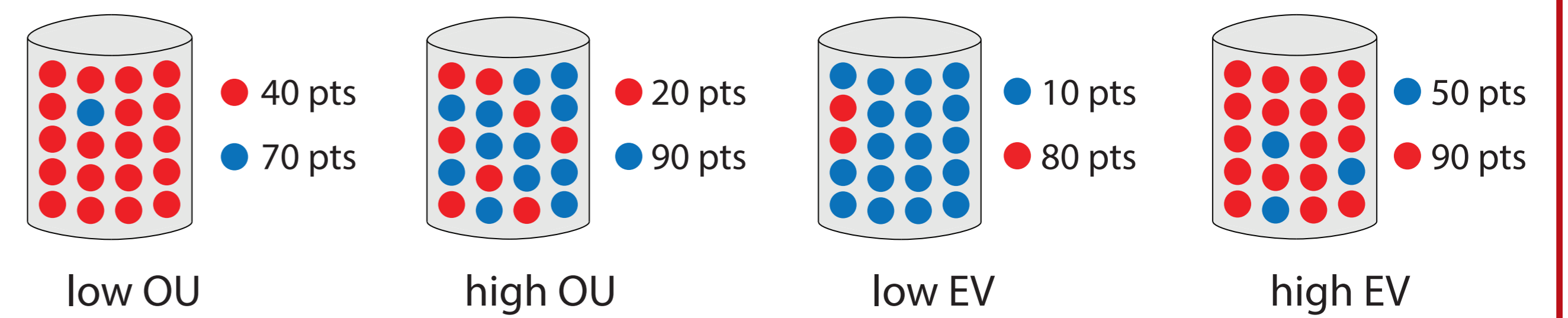
We manipulated:

- Trial type: **choice** / **no-choice-preferred** / **no-choice-unpreferred**

- **Outcome uncertainty** = entropy vase x difference points

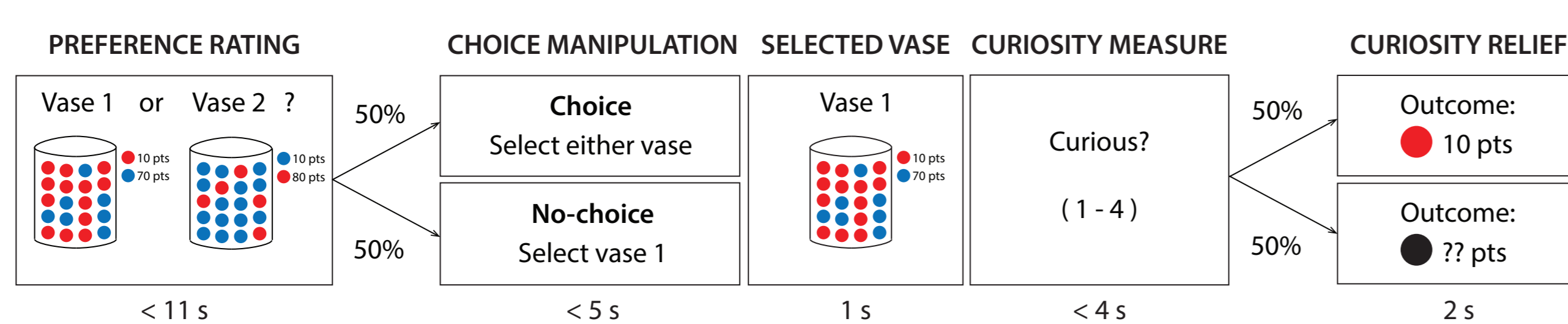
- **Expected value** = weighted average (probability x points | colour)

Examples:

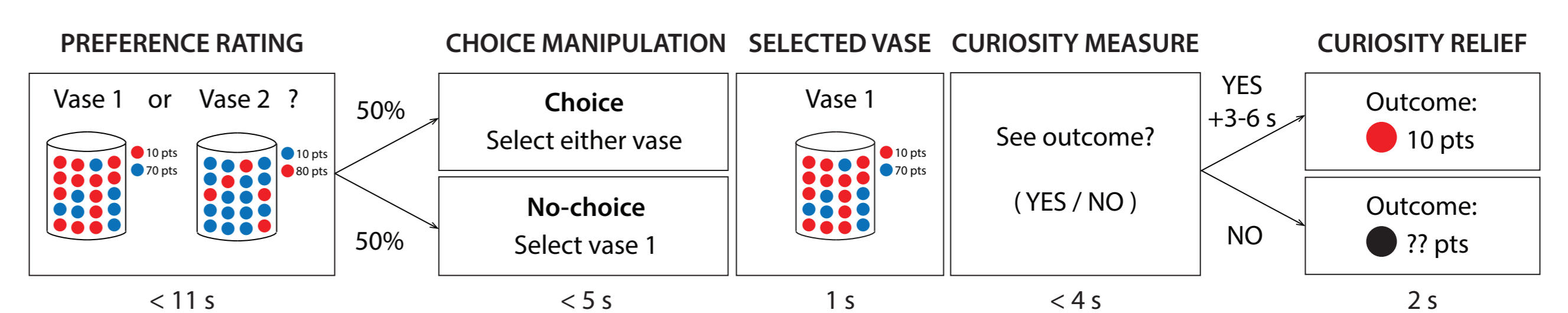


TASK

Experiment 1: Explicit curiosity (**curiosity rating**)



Experiment 2: Implicit curiosity (**willingness to wait**)

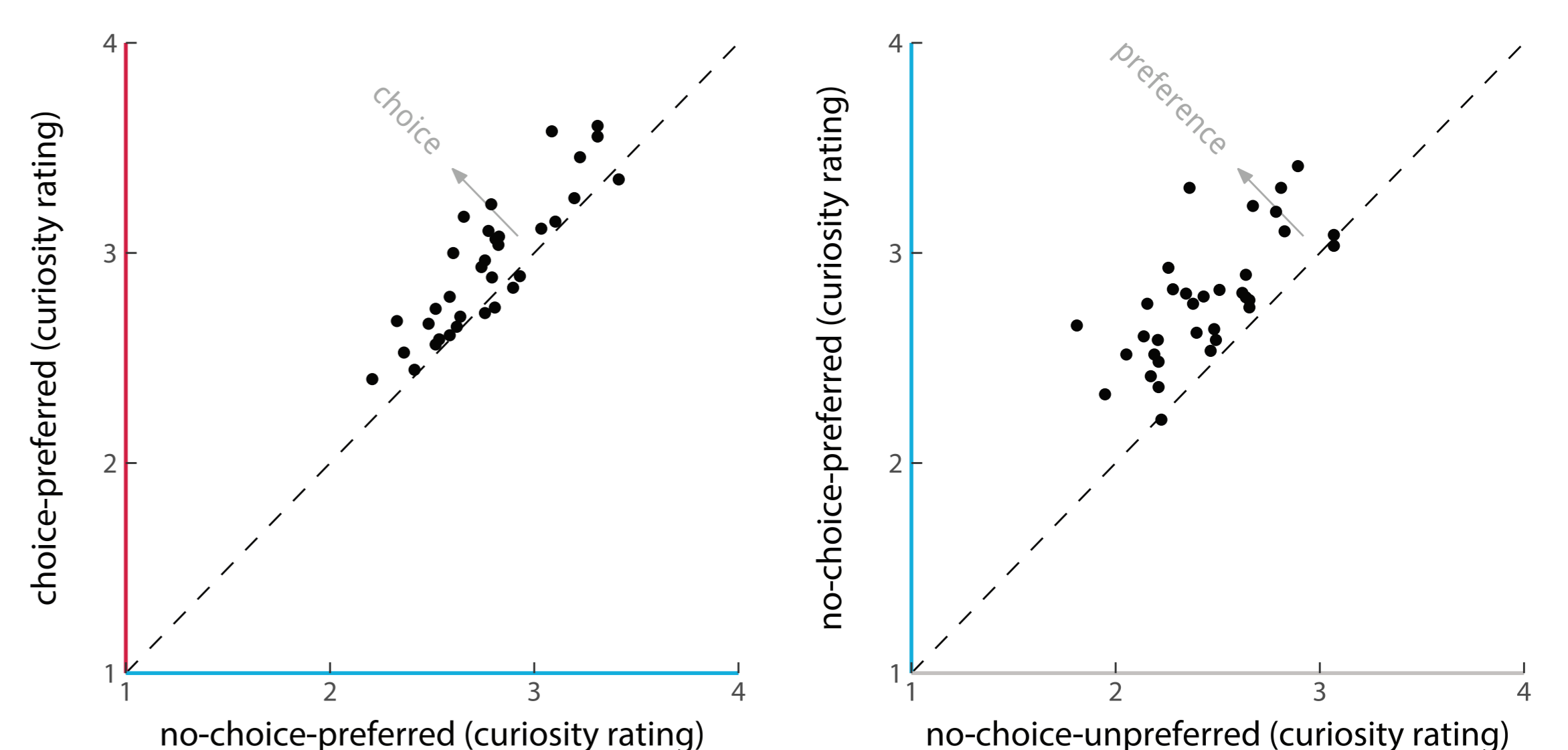
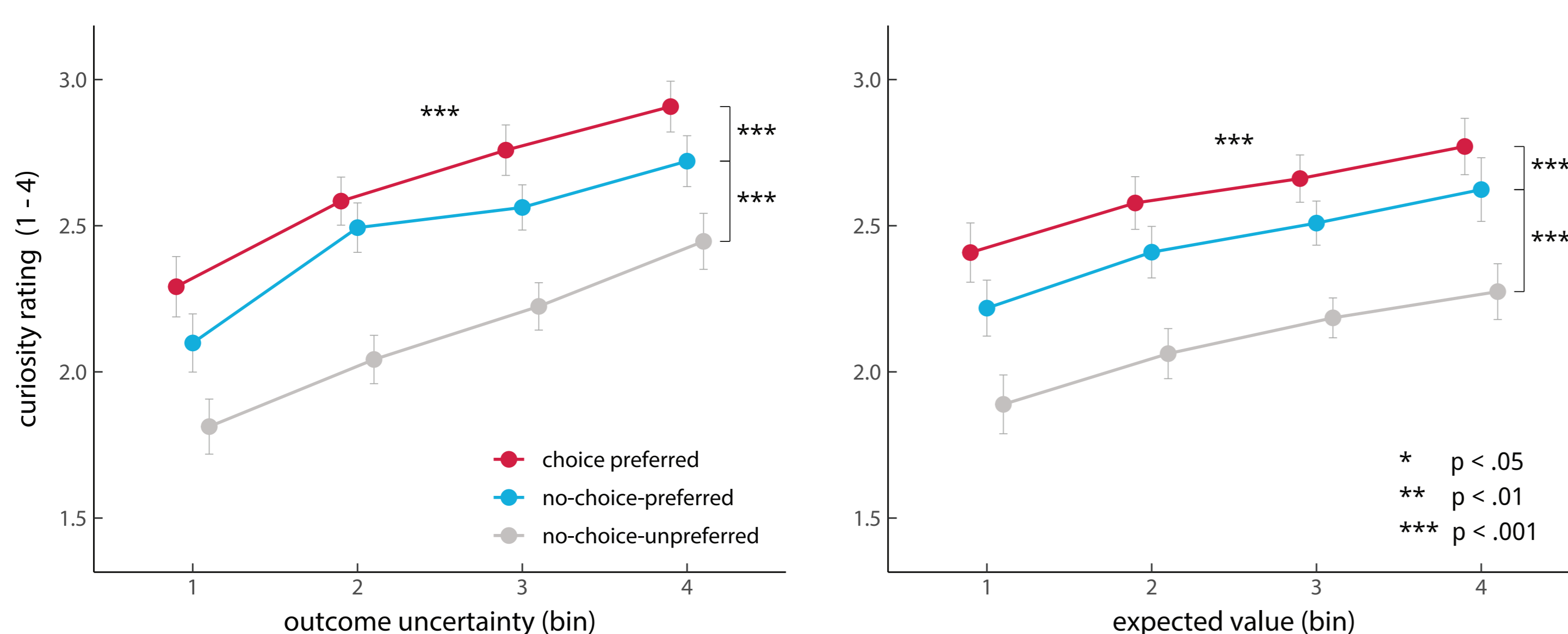


RESULTS

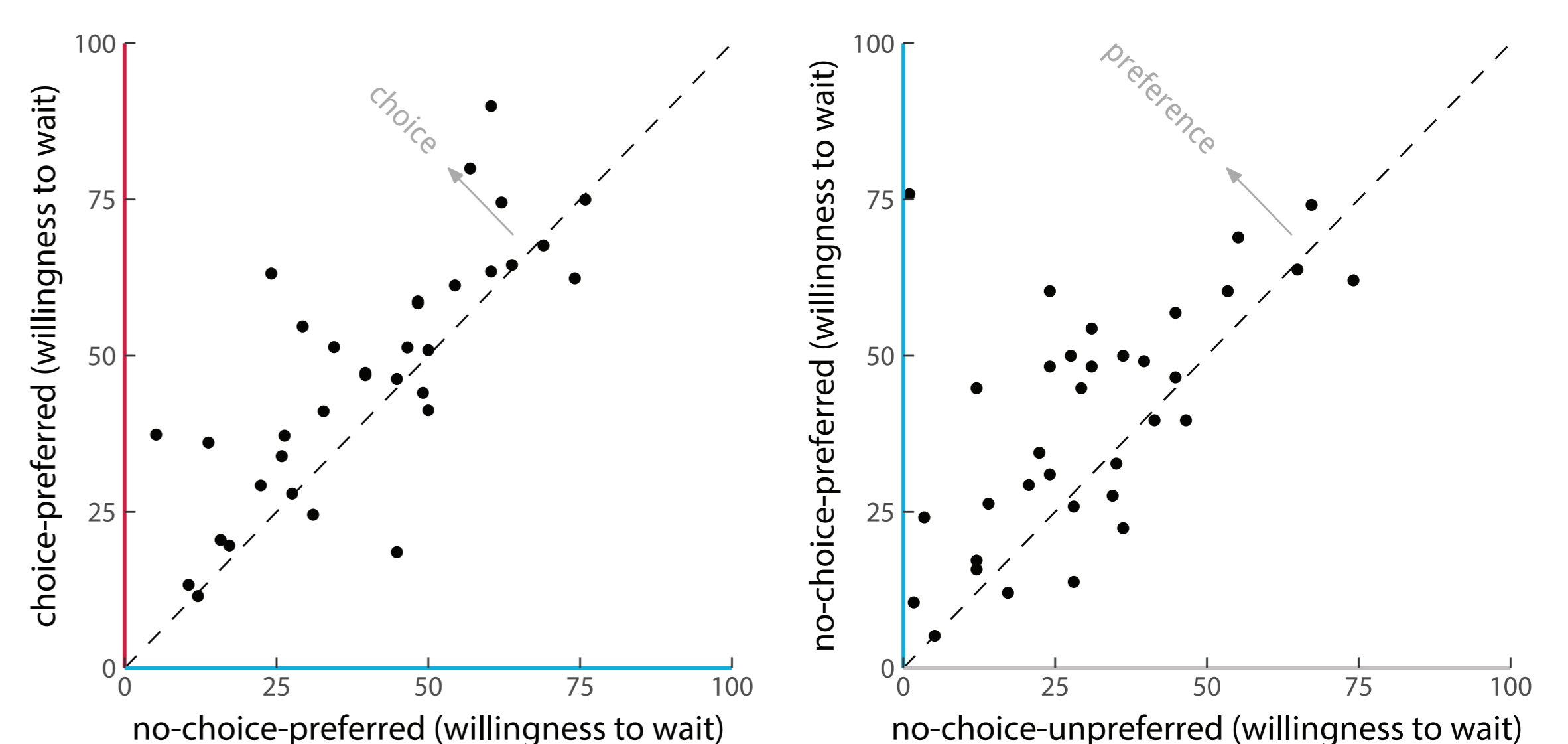
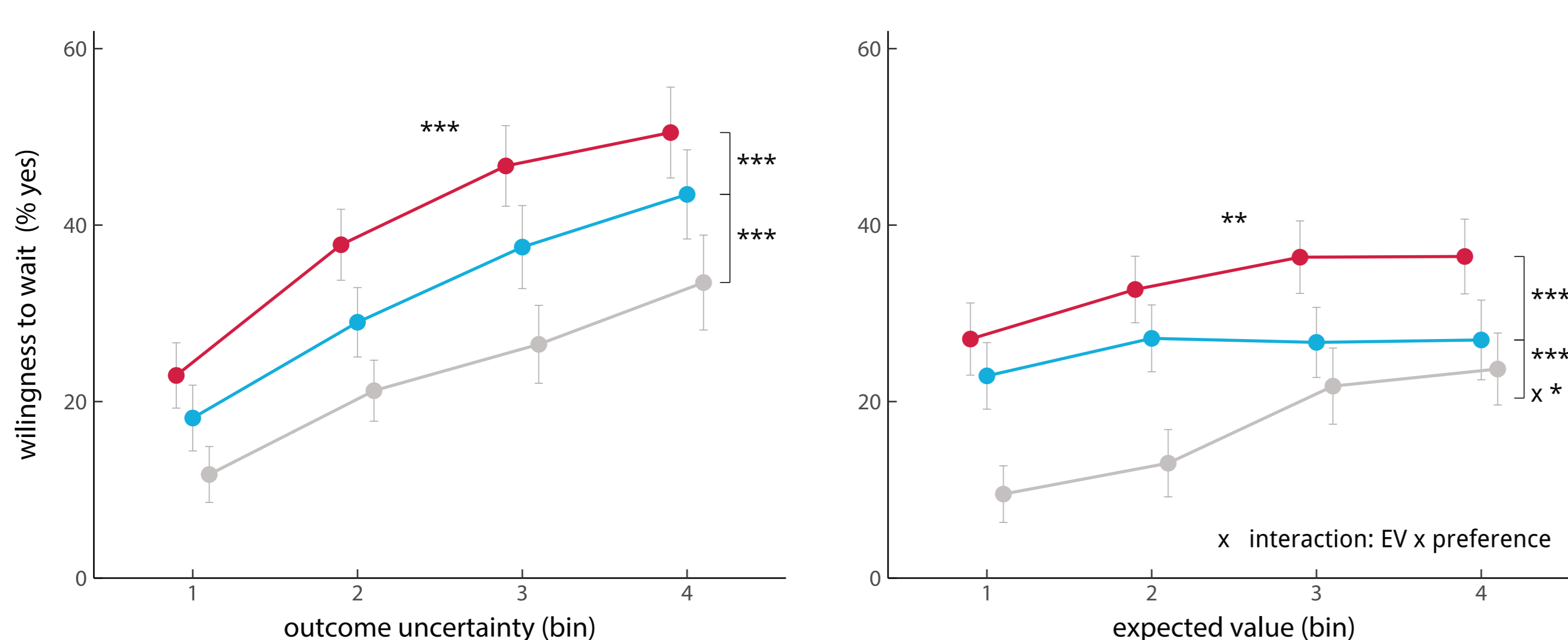
Choice and **preference** enhanced curiosity (measured explicit and implicitly).
Curiosity increased as a function of outcome uncertainty and expected value.

Most participants exhibited greater curiosity for **chosen** than **not chosen** options, and for **preferred** than **unpreferred** options.

Experiment 1:



Experiment 2:



DISCUSSION

Choice enhances curiosity.

People are more curious after having made a choice and, in the absence of choice, seek information more readily from a preferred source.

The effect of choice (and preference) on curiosity does not interact with the drive to maximise information gain (i.e., resolve high uncertainty) or to form positive beliefs (i.e., seek high expected value).

This suggests that choice-enhanced curiosity results from an independent mechanism.

Which (neural) mechanisms underlie the enhancing effect of choice on curiosity?

REFERENCES

- Kidd, C., & Hayden, B. Y. (2015). Neuron.
- Gottlieb, J., Oudeyer, P.-Y., Lopes, M., & Baranes, A. (2013). Trends in Cognitive Sciences.
- van Lieshout, L. L. F., Vandenbroucke, A. R. E., Müller, N. C. J., Cools, R., & de Lange, F. P. (2018). The Journal of Neuroscience.
- Cockburn, J., Collins, A. G. E., & Frank, M. J. (2014). Neuron.
- Sharot, T., Velasquez, C. M., & Dolan, R. J. (2010). Psychological Science.
- Voigt, K., Murawski, C., Speer, S., & Bode, S. (2019). The Journal of Neuroscience.