

# Capturing Asymmetric Bias in Probability Judgements

**Aidan Tee**

University of Warwick, Coventry, United Kingdom

**Joakim Sundh**

Uppsala University, Uppsala, Sweden

**Adam Sanborn**

University of Warwick, Coventry, United Kingdom

**Nick Chater**

University of Warwick, Coventry, United Kingdom

## Abstract

Individuals make biased and variable probability judgements. Recent models such as the Bayesian Sampler (Zhu, et al., 2020), Probability Theory Plus Noise (Costello & Watts, 2014), and the Quantum Sequential Sampler (Huang et al., 2023) capture a wide range of effects by assuming people are biased towards indifference (i.e., 0.5). However, in some experiments participants instead showed asymmetric bias, defined as a pull toward non-0.5 values. We investigated asymmetric bias in 5 experiments, where participants judged the probabilities of dice rolls. While participants' judgements were independent of whether they were in a high or low probability environment or the number of alternative options displayed, participants showed a bias toward low ( $<0.5$ ) estimates. Furthermore, participants showed the highest variability for judgements below 0.5. This latter effect can be captured by an asymmetric prior in the Bayesian Sampler, but not by the biasing mechanisms in the other models.