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Abstract

Human probability judgements appear systematically biased, in apparent tension with Bayesian models of cognition. But perhaps the brain does not represent probabilities explicitly, but approximates probabilistic calculations through a process of sampling, as used in computational probabilistic models in statistics. The Bayesian sampling viewpoint provides a simple rational model of probability judgements, which generates biases such as conservatism. The Bayesian sampler provides a single framework for explaining phenomena associated with diverse biases and heuristics, including availability and representativeness. The approach turns out to provide a rational reinterpretation of noise in an important recent model of probability judgement, the probability theory plus noise model (Costello & Watts, 2014; 2016; 2017; Costello, Watts, & Fisher, 2018), and captures the empirical data supporting this model.