Bias in Belief Updating: Combining the Bayesian Sampler with Heuristics

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Abstract

People systematically deviate from the rational Bayesian updating of beliefs, as notably evidenced by conservatism and base-rate neglect. The primary cognitive models that explain these biases include simple heuristics (Woike et al., 2023, https://doi.org/10.1016/j.cogpsych.2023.101564) and stochastic sampling approximations of the Bayesian solution, like the Bayesian Sampler (Zhu et al., 2020, https://doi.org/10.1037/rev0000190). However, neither type of explanation appears entirely complete, as the data fall between the two; only about half of participants' responses align with heuristics. Could these results be explained by a new class of models that blend heuristics with Bayesian models? We test both simple mixtures of heuristics and the Bayesian Sampler, as well as a hybrid model in which heuristics are used to set a prior that improves estimates based on stochastic samples. Our analysis indicates that neither heuristics nor the Bayesian Sampler alone are sufficient to explain the data.

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