Nonlinear Probability Weighting Can Reflect Attentional Biases in Sequential Sampling

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Abstract

Nonlinear probability weighting allows cumulative prospect theory (CPT) to account for seminal phenomena in risky choice (e.g., the certainty effect). The attentional drift diffusion model (aDDM) formalizes that attentional biases can shape preferences as a sequential sampling process. We simulated choices between safe and risky options using the aDDM with varying attentional biases to safe or risky options and modeled these choices with CPT. Changes in preferences due to attentional biases were systematically reflected in the parameters of CPT's weighting function (curvature, elevation). We demonstrate that this also holds empirically, in the sampling paradigm in decision from experience. Hence, nonlinear probability weighting can arise from option-specific attentional biases in information search. This challenges common interpretations of probability-weighting parameters, suggests novel attentional explanations for empirical phenomena associated with characteristic shapes of CPT's probability-weighting function, and adds to the integration of two prominent computational frameworks for decision making.