The Temporal Evolution of Implicit Bias in Perceptual Decision-Making

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Abstract

Priors shape decision-making, but how bias emerges remains unclear. Using a drift-diffusion model, we analyzed data from 40 participants completing a forced-choice task in which they judged the direction of apparent motion of dot stimuli of varying coherence. For one stimulus color, unbeknownst to participants, one direction occurred more frequently (positive prior), whereas for the other color, the frequencies were balanced. Results show drift rate increased throughout learning for both conditions. However, a greater drift rate emerged early for the positive prior condition, indicating a rapid increase in evidence accumulation consistent with the prior. Starting point increased gradually with practice only in the positive prior condition, suggesting that participants acquired a bias toward the prior-consistent outcome. These findings suggest that perceptual decision-making bias emerges through both a rapid allocation of attention to information consistent with the prior and a gradual development of response bias toward the globally more frequent outcome.

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