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How Habit Learning Guides Planning: A Normative View and Behavioral Evidence

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Abstract

Human behavior is determined by both learned habits and prospective planning. Because planning is computationally expensive, humans face two meta-control challenges: They must determine when to plan and, if so, which potential futures to consider. We propose that habit learning itself could solve these meta-control problems by prioritizing which futures to explore and to what extent. We show how this notion emerges from a normative Bayesian model and test one of the resulting predictions empirically. To do so, we developed a behavioral paradigm that operationalizes model-based planning as spatial navigation through a maze. Our findings suggest that humans indeed incorporate learned habitual information during planning in a manner closely aligned with the Bayesian model. This corroborates existing reinforcement learning accounts and contributes a normative and unifying perspective.