The Emergence of Utility from Episodic Memory in a Model of Decision-Making Under Risk

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Abstract

This research explores computational models of decision-making under risk. Our models replace the conventional utility function with an episodic memory retrieval process, dynamically estimating utility by recalling past events. Rather than beginning deliberation with explicit knowledge of choice outcome utilities, the value of an outcome emerges from the stochastic recall of related past experiences. In order to reflect both the cognitive and neural dynamics of episodic recall during decision making, our approach incorporates a computational neuroscience model of the hippocampus. Comparisons between this account and previously published decision-making models demonstrate consistency with patterns of behavior captured by those models, while also making predictions concerning the specific effects of contextually cued memory retrieval. We also propose explorations involving the modeling of interactions between the hippocampus and the prefrontal cortex with the goal of shedding light on the neural basis of deliberation.

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