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# UC San Diego Cognitive Science

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## Adaptive Control with Episodic Mechanisms

Friday, September 6th, 2024

1:00pm – 3:00pm, CSB 003

or

Zoom: <https://ucsd.zoom.us/j/94953819541?pwd=w0l1OWQO94kdUgEWu9Y3bYEInTiDFA.1>

(password: 476158)

### Abstract:

What is memory for? Our daily experiences suggest that remembering serves adaptive purposes. Rather than simply storing information, memory actively selects, connects, and organizes it to predict the future and guide decisions. However, despite the suggestive links between memory and adaptive behavior, the mechanistic basis of this connection remains unclear. Memory research largely studies memory in isolation from other cognitive functions, while the decision-making literature leaves out detailed memory mechanisms.

This dissertation aims to improve the existing memory-for-decision-making theory by grounding model-based sequential decision-making in classic mechanistic models of episodic memory. Bridging across a body of previous results, I propose a formal framework for memory-informed decision-making that is cognitively plausible. In a series of three projects, I first show how a phenomenological account of episodic memory suggests methods of model-based evaluation and choice in sequential tasks. I then empirically test several key predictions implied by this framework, revealing remarkable decision patterns resulting from episodic memory biases. Finally, I extend the core framework to further explain how episodic memory operates over long timescales and event structures to enable continual learning and control. These three projects lay the groundwork for reverse engineering the hidden cognitive processes behind adaptive decision-making by leveraging well-studied episodic mechanisms.

### Committee members:

Kiyonaga, Anastasia (Chair) - UCSD Cognitive Science

Benna, Marcus - UCSD Neurobiology

Mattar, Marcelo - NYU Psychology

Mukamel, Eran - UCSD Cognitive Science

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