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Title: Why did I drive to work on my day off: Perspectives on goal-directed and habitual behavior with implications for future AI systems

Although modern AI systems excel at complex tasks such as language generation, they lack the adaptive efficiency that characterizes human behavior. Humans seamlessly balance deliberate planning with automatic responses depending on context and computational demands.

In this talk we will discuss recent frameworks suggesting that goal-directed and habitual control are integrated rather than separate systems. Butz et al. (2025) propose a computational account where context inference optimizes cognitive effort, while Hamker et al. (2025) propose an anatomical perspective through interacting cortico-basal ganglia loops and learned shortcuts. I will outline the potential synergies and incompatibilities that could arise in integrating these frameworks. Finally, I will discuss how principles from these frameworks particularly context integration and shortcuts could potentially inspire more efficient AI architectures and how these principles relate to already published AI approaches.

References:

Butz, M. V., Mittenbühler, M., Schwöbel, S., Achimova, A., Gumbsch, C., Otte, S., & Kiebel, S. (2025). Contextualizing predictive minds. *Neuroscience & Biobehavioral Reviews*, 168, 105948.

Hamker, F. H., Baladron, J., & Janssen, L. K. (2025). Interacting corticobasal ganglia-thalamocortical loops shape behavioral control through cognitive maps and shortcuts. *Trends in Neurosciences*.