

DISTINGUISHED LECTURER SERIES

Brain Evolution and the Continuous Extension of Control



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Friday, March 27, 2026, 3-4pm
Kinesiology Hall, Room 101

Abstract: The brain is often described as an information processing system divided into functions such as object recognition, working memory, decision-making, action planning, etc. However, neurophysiological data do not support many of the predictions of these classic subdivisions. In this talk, I will explore the possibility of resynthesizing a different set of functional distinctions, guided by the growing body of data on brain evolution. I will summarize, in chronological order, a proposed sequence of innovations that appeared in nervous systems along the lineage that produced humans, gradually building up an alternative conceptual taxonomy of brain functions. These emphasize mechanisms for real-time interaction with the world, rather than for building explicit knowledge of the world, and the relevant representations emphasize pragmatic outcomes rather than decoding accuracy, mixing variables in the way seen in real neural data. I suggest that this alternative taxonomy may offer a more natural mapping between behavior and neural mechanisms.

Dr. Paul Cisek is a full professor in the Department of Neuroscience at the University of Montreal. He has a background in computer science and artificial intelligence, doctoral training in computational neuroscience with Stephen Grossberg and Daniel Bullock, and postdoctoral training in neurophysiological recording in non-human primates with Stephen Scott and John Kalaska. His research combines these techniques into an interdisciplinary approach to understanding how the brain controls our interactions with the world, focusing on how potential actions are specified and how they compete in the cortical and subcortical circuits of humans and other primates. His work has been published in journals such as *Nature*, *Neuron*, *Philosophical Transactions*, *Journal of Neuroscience*, and has been supported by CIHR, NSERC, CFI, FRQS, FRQNT and the EJLB Foundation.