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Faculty of Psychology

Colloquium lecture of Dr. Aurelio Cortese

Higher cognitive resources for efficient learning

How do we learn from limited experience?

A central issue in reinforcement learning (RL) is the ‘curse-of-dimensionality’, which arises when a problem's degrees-of-freedom are much larger than the number of available training samples. In the brain, higher cognitive functions such as metacognition or abstraction may provide a biological solution by generating low dimensional representations on which RL can operate.

In this talk I will present our recent work in which we used closed-loop neuroimaging and modeling to investigate the neural and computational basis of efficient RL. We found that people can learn remarkably complex task structures non-consciously, and that metacognition appears tightly coupled to this learning ability. Furthermore, when people use an explicit (conscious) policy to select relevant information, learning is accelerated by abstractions. The prefrontal cortex is differentially involved in separate aspects of learning: dorsolateral prefrontal cortex encodes metacognitive processes and is coupled with the basal ganglia, while ventromedial prefrontal cortex engages in valuation and abstraction and is coupled with sensory cortices.

I will discuss the implications of these findings for our understanding of complex behaviors.



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This Colloquium Lecture takes place online!
Thursday, June 2, 2022; 3 pm