

02 luglio 2025

Palazzo della Sapienza

Aula Sap I

Via Curtatone e Montanara, 15 - Pisa

Ore 16:00

Prof. Aurelio Cortese

Head, dep. Decoded Neurofeedback Computational Neuroscience Laboratories, ATR
Institute International, Kyoto - Japan



How metacognition and higher cognitive functions might shape learning and error assignment

Abstract

How do humans learn from small samples and adapt to changing conditions? In a series of studies, we explored the role of metacognition (operationalised as decision confidence), abstraction and attention in shaping learning and error assignment. We combined decision-making tasks with computational modelling, causal neuroimaging (fMRI-based decoded neurofeedback), and artificial neural networks. Our findings show that abstractions can be learned through a valuation process mediated by attention, resulting in faster/more robust performance. Confidence tracks these abstractions, governs behaviour updates and is linked to unique patterns of neural activity in fronto-parietal cortices. These patterns synchronise with neural representations of prediction errors during learning to (potentially) speed up the acquisition of new knowledge. Overall, these studies uncover important elements of the neural and cognitive architecture of intelligent behaviour in humans.