

Colloquium

The volitional brain in action: The synergy of feedback and feedforward control through counterfactual error signals

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Abstract

Volitional motor control can be seen as the result of a gradual replacement of feedback by feedforward control. The working group of Paul Verschure has addressed this question from the perspective of an integrated architecture called the Distributed Adaptive Control (DAC) theory of mind and brain. DAC proposes that the brain is a multi-layer control system which optimizes the how of action by considering why (motivation), what (objects), where (space), when (time) and who (agents) or the H5W problem. In order for DAC to realize optimal solutions in foraging problems, its decision-making renders policies that simultaneously optimize perceptual evidence, memory bias, goals, and utility. This raises the question of what the principles are that underlie the processing and adaptation of these factors. This talk will focus on advancements made to link policy adaptation and perceptual learning. In particular, the argument will be made that adaptive motor control can also be obtained by relying on a cascade of purely sensory predictions that drive feedback control via counterfactual errors or Hierarchical Sensory Predictive Control. Robot experiments conducted by the Verschure group have demonstrated the robustness of this solution.

Brief Bio

Paul Verschure is Catalan Institute of Advanced Studies (ICREA) Research Professor, Director of the Synthetic Perceptive, Emotive and Cognitive Systems Laboratory (specs-lab.com) at the Institute for Bioengineering of Catalunya and the Barcelona Institute of Science and Technology. Paul has received his MA and Ph.D. in Psychology, and has worked in Neuroscience, Cognitive Science, Robotics and Artificial Intelligence, Paul is founder/CEO of Eodyne Systems S.L. (Eodyne.com) as well as the founder/Chairman of two foundations, the Future Memory Foundation (futurememoryfoundation.org) and the Convergent Science Network Foundation (csnetwork.eu) Paul manages a multidisciplinary team of about 30 researchers (specs-lab.com) with whom he has published over 400 articles in leading journals and conferences in a range of disciplines and has completed 15 Ironman races

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Seminar room, ground level