Consciousness and Guided Self Organization: The Distributed Adaptive Control of the Mind, Brain, Body nexus

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A fundamental challenge faced by 21st century science is to understand the teleological nature of living systems from the perspective of causal systems. A particular case in point is the complex relationship between mind, brain and body (MBB) where we are facing the fundamental question of how matter can give rise to consciousness. In my talk I will directly address this question and argue that consciousness is a natural phenomenon that arose during evolution in order to enhance fitness in a multi-agent social environment. I will show that this change, that was triggered by the Cambrian explosion created unique new problems that required the coordination of both parallel distributed real-time control systems with sequential integrated and coherent task descriptions. I will present my theory of the mind, brain, body nexus, Distributed Adaptive Control (DAC), and show how it unifies existing approaches towards consciousness, matches to pertinent neuronal systems and has been validated in a range of robot systems. DAC proposes that the brain can be seen as comprising tightly coupled but yet distinguished layers that are in turn organized across specific domains. Building on this foundation I will in more detail analyse the non-neuronal feedback loop that DAC has revealed that further couples the different facets of the MBB, called behavioral feedback, and its impact on the structuring of perception, cognition and action.