On the Neurodynamics of Intention, Decision and Free Will

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Abstract What is the role of consciousness in volition and decision making? Are our actions fully determined by brain activity preceding our decisions to act, or can consciousness instead affect the brain activity leading to action? This has been much debated ever since the famous experiments by Benjamin Libet in the 1980s, where the current most common interpretation is that conscious free will is an illusion. Intentionality, which can be seen as a precursor to conscious (free) will, is central in Freeman neurodynamics of the action-perception cycle, where intention would precede our conscious decision to act. Consciousness may be seen as an emergent property of the neural activity of the brain, but in order for consciousness to play any role in our (choice of) actions, we must also consider downward causation in the nervous system. In addition, there may be circular causation in the action-perception cycle, and hence it is crucial to study causal pathways in the brain during volition. In this presentation, I will describe a newly started project, where neuroscience, computational modeling and philosophy will be applied to elucidate the ancient enigma of free will. Computational modeling of brain parts involved in intention, decision, and action will complement experimental studies with EEG, MEG and fMRI to explore and map the causal relationships. Already, we have developed a neurocomputational model of the neurodynamics involved in decision making, involving both emotional and rational processes. In addition to individual experiential decision making, we also study the influence of the social and natural environment on human decisions. Our results so far confirm the notion that if decisions have to be made fast, emotional processes and aspects dominate, while rational processes are more time consuming and may result in a delayed decision. From some recent experiments in our consortium it appears that the readiness potential found in Libet's experiments with arbitrary choices are not found for more deliberate choices, where free will is more likely to come into play.

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