University of Zurich[UZH]

Department of Economics – Neuroeconomics Seminar

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A causal brain network account of mentalizing during strategic social interactions

During competitive interactions, humans have to estimate the impact of their own actions on their opponent's strategy. In this presentation, I will provide evidence that neural computations in the right temporo-parietal junction (rTPJ) and interconnected structures are causally involved in this process. By combining inhibitory continuous theta-burst transcranial magnetic stimulation (cTBS) with model-based functional magnetic resonance imaging (fMRI), we show that disrupting neural excitability in the rTPJ reduces behavioral and neural indices of mentalizing-related computations, as well as functional connectivity of the rTPJ with ventral and dorsal parts of the medial prefrontal cortex. These results provide a causal demonstration that neural computations instantiated in the rTPJ are neurobiological prerequisites for the ability to integrate opponent beliefs into strategic choice, through system-level interaction within the valuation and mentalizing network. In a second study, we examine whether these mentalizing-related computations in the TPJ are triggered by the social context of interacting with another human or whether they rather reflect specific algorithmic demands associated with interactions with a reactive process, irrespective of whether this occurs in a social context or not. Interestingly, neural activity in the rTPJ appears to track the algorithmic demands of the choice problem, but this activity influences choice and associated neural processes more strongly when participants believe they face a human opponent. This argues that neural computations in the TPJ are not functionally specialized for "social behavior" per se but rather reflect specialized computations that detect and deal with interactive processes, which are specifically choice-relevant during interactions with other human beings. Taken together, the two studies presented here thus move towards a mechanistic understanding of how neural computations in the TPJ and interconnected structures contribute to the control of strategic behavior during social interactions.