University of Zurich[UZH]

Department of Economics – Neuroeconomics Seminar

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Neural representations of uncertainty in working memory and beyond

Due to various sources of internal and external noise, ranging from fluctuations in neural activity to noisy sensory inputs, our perception, memory, and decisions are inherently uncertain. To make better decisions, the brain must represent this uncertainty and incorporate it into decisions and planning. While extensive theoretical work and emerging empirical evidence have revealed how uncertainty is represented during perceptual encoding, the neural and computational mechanisms underlying uncertainty in higher-level cognition remain far less understood. In this talk, I will present our recent studies investigating how probabilistic neural coding frameworks, originally developed in visual perception, can be extended to working memory. I will discuss evidence for probabilistic representations of working memory from both fMRI BOLD activity, and neural oscillations measured with EEG. These representations capture fluctuations of memory uncertainty across trials, individuals, and attentional states. Lastly, I will extend this framework to subjective valuation, demonstrating how a similar coding scheme may represent uncertainty in subjective value, and how these uncertainty signals can influence subsequent value-based decisions.