University of Zurich[UZH]

Department of Economics – Neuroeconomics Seminar

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Neuronal computation underlying inferential reasoning in humans and mice

Every day we make decisions critical for adaptation and survival. We repeat actions with known consequences. But we also draw on loosely related events, to infer and imagine the outcome of entirely novel choices. These inferential decisions are thought to engage a number of brain regions, however the underlying neuronal computation remains unknown. In this talk I will show how a cross-species approach in humans and mice can be used to reveal the functional anatomy and neuronal computation underlying inferential decisions. I will show that during successful inference, the mammalian brain uses a hippocampal prospective code to forecast temporally-structured learned associations. Moreover, during resting behaviour, short-timescale coactivation of hippocampal cells represent inferred relationships in sharp-wave/ripples, thereby “joining-the-dots” between events that have not been observed together but lead to profitable outcomes. Computing mnemonic links in this manner may provide a general mechanism to build a cognitive map that stretches beyond direct experience, thus supporting flexible behavior.