University of Zurich[UZH]

Department of Economics – Neuroeconomics Seminar

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Neural Models of Compositionality

Compositionality is widely regarded as one of the cornerstones of general intelligence. It refers to the ability to rapidly generate or learn new concepts by combining simpler ones according to an underlying syntax, as exemplified in natural language. Compositionality was long thought to be primarily a human capacity and widely considered incompatible with artificial neural networks. Recent neural models, however, have begun to challenge this view. I will present two such models: one focused on simple cognitive tasks, the other on the control of complex motor trajectories. In both cases, few-shot learning emerges through the discovery of compositional solutions. Remarkably, the latter approach captures key, and often counterintuitive, aspects of rodent behavior in escape tasks, precisely the kind of setting in which animals exhibit near zero-shot learning. I will also discuss how these findings connect naturally to more sophisticated forms of compositionality in humans, particularly the use of language to support zero-shot learning and inference.