



**University of
Zurich** ^{UZH}

Department of Economics – Neuroeconomics Seminar

December 13, 2018 - 17:00 - 18:00

Sam Gershman
Harvard University

Imaginative reinforcement learning

Imagination enables us not only to transcend reality but also to learn about it. In the context of reinforcement learning, an agent can rationally update its value estimates by simulating an internal model of the environment, provided that the model is accurate. In a series of sequential decision-making experiments, we investigated the impact of imaginative simulation on subsequent decisions. We found that imagination can cause people to pursue imagined paths, even when these paths are suboptimal. This bias is systematically related to participants' optimism about how much reward they expect to receive along imagined paths; providing feedback strongly attenuates the effect. The imagination effect can be captured by a reinforcement learning model that includes a bonus added onto imagined rewards. Using fMRI, we show that a network of regions associated with valuation is predictive of the imagination effect. These results suggest that imagination, although a powerful tool for learning, is also susceptible to motivational biases.