



**University of  
Zurich** <sup>UZH</sup>

## Department of Economics – Neuroeconomics Seminar

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### **Dissociating neural learning signals in human sign- and goal-trackers**

Individuals differ in how they learn from experience. In Pavlovian conditioning models, where cues predict reinforcer delivery at a different goal location, some animals—called sign-trackers—come to approach the cue, whereas others - called goal-trackers - approach the goal.

In sign-trackers, model-free phasic dopaminergic reward-prediction errors underlie learning, which renders stimuli 'wanted'. Goal-trackers do not rely on dopamine for learning and are thought to use model-based learning. We demonstrate this double dissociation in 129 male humans using eye-tracking, pupillometry and functional magnetic resonance imaging informed by computational models of sign- and goal-tracking.

We show that sign-trackers exhibit a neural reward prediction error signal that is not detectable in goal-trackers. Model-free value only guides gaze and pupil dilation in sign-trackers. Goal-trackers instead exhibit a stronger model-based neural state prediction error signal. This model-based construct determines gaze and pupil dilation more in goal-trackers.