



**University of
Zurich** ^{UZH}

Department of Economics – Neuroeconomics Seminar

November 12, 2020 - 17:00 - 18:00

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Learning to predict and avoid pain: behavioural and brain mechanisms

Learning to predict and avoid pain is critical for health and survival. However, in contrast to the extensive literature on reward learning, the neurocomputational mechanisms that support learning from aversive events like pain are still largely unknown. I will present two studies that aimed to increase our understanding of pain-related learning in humans, using a combination of behavioural measures, computational modelling, fMRI and (in study 2) pharmacological manipulations. Study 1 focuses on cue-pain association learning, and on how this is affected by people's prior beliefs. We find evidence that prior beliefs about pain not only influence pain perception, but also bias learning, and that the combination of these effects can produce 'self-reinforcing' expectations that are resistant to extinction. Study 2 examines the neural basis of pain-avoidance learning. Our results suggest that received and successfully avoided pain drive learning via two separate brain systems, and that the dopamine and endogenous opioid systems modulate learning from avoided pain. Taken together, our findings suggest that pain-related learning involves distinct behavioural and brain mechanisms, which may inform future basic and clinical research.