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# Pupil dynamics preceding switches in task engagement

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## Abstract

When completing a task for a prolonged period, our ability to sustain attention fluctuates over time. Accordingly, in mice, disengaged behaviour has temporal autocorrelation (i.e., 'disengagement states'), with lapses clustering in time, rather than occurring randomly. In this disengaged state, mice make more errors and provide responses biased towards one side. What neural and physiological processes trigger the transition into, and out of, disengagement states? Here, we investigated the role of pupil-linked arousal. We used a public dataset of 140 mice performing a perceptual decision-making task, including extracellular recordings alongside behavioural and pupil responses. We applied hidden Markov models to identify engagement states based on response times. Preliminary results show that disengaged trials are associated with larger and more variable baseline pupil, and suggest that pupil size changes precede state transitions. These findings will provide a starting point for exploring the cortical, subcortical and neuromodulatory processes preceding task (dis)engagement.