Introduction

• We envision using states, derived from physiological signals, to inform adaptive technologies, and augment human performance.

• However, the pupil signal is more strongly influenced by non-cognitive than cognitive stimuli, thus limiting generalizability of pupil-linked cognitive processes.

• To overcome this obstacle, task-independent pupil features are needed. We leverage a unique longitudinal pupillometry data set to identify candidate features.

• Here, we assess the reliability of pupil features across tasks and the reliability of the relationship between pupil features and behavior.

Methods

• Participants (n=30) completed 8 sessions of the modular arithmetic task over 112 days.

• Participants completed three tasks (MA, PVT, VWM) and a Rest period each session.

• We extracted three pupillometric features (Baseline, Peak amplitude and Peak latency) and correlated them with response time (RT) on correct trials.

Results

1. Are pupil features consistent across tasks?

2. Are pupil features consistently related to response time within and/or across tasks?

3. Are pupil features consistently related to response time on a trial and/or session level?

Discussion

• Results demonstrate that tonic baseline was consistent across tasks and was correlated with average session response time across tasks, indicating that baseline reflects a relatively stable pupil-linked arousal process.

• In contrast, phasic features were inconsistent across task, indicating that task demands and structure drive phasic pupil responses.

• At the trial level our model indicates that peak latency (T=50.7) was most strongly correlated with response time across the three tasks while peak amplitude (T=11.2) was only modestly correlated.

• These results suggest that peak amplitude and latency, while task-specific, reflect a common pupil-linked decision process while baseline reflects more stable pupil-linked arousal processes that contribute to performance.