How do attentional fluctuations during encoding influence memory?

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Introduction

Attention influences memory: we have better memory for attended information vs. unattended ones.[1, 2, 3] Attention fluctuates over time: sometimes we are focused but at other times we are distracted.

How can we measure these moment-to-moment fluctuations in attention?

How do these fluctuations influence our memory?

Previous research suggests that changes in pupil size reflect fluctuations in attention.[4, 5, 6] Measuring participants' pupil size changes during the task could give us valuable insights into the fluctuations of their attention levels which we can then relate to later memory.

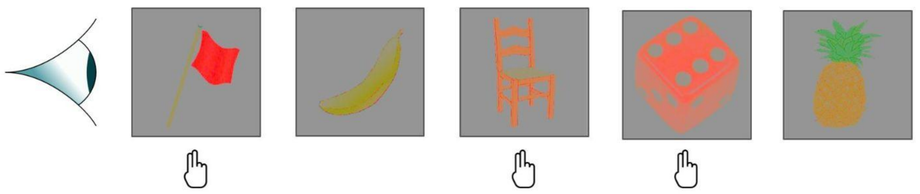
Hypothesis

We hypothesize that being in a **better (vs. worse) attentional state** during an initial experience will result in:

- Better overall memory for the experience
- Better memory of the order of events in that experience

Task

Phase 1: Encoding



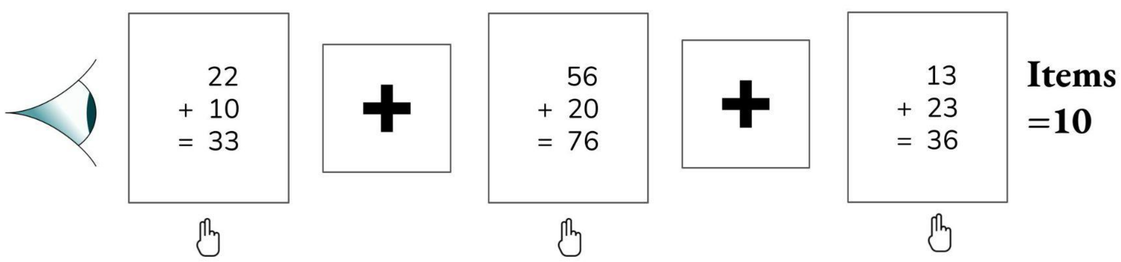
Items =80

Is the object a food or a non-food item?
Non-food = press a button,
Food = withhold response

Attentional States:

- "In the zone" → *focused*
- "Out of the zone" → *distracted*

Phase 2: Math distractor task



Items =10

Is the answer correct or incorrect?

Repeat 3x

Phase 3: Voice-recorded verbal free recall

Flag, Chair, Banana, ...

Eye-tracking

- High resolution images of eyes
- The **pupil center** and **cornea** reflection are measured by the camera

Pupil diameter changes

Conclusion

- Insights into ways to enhance recall and memory retrieval
- Implications for clinical impairments in attention (e.g. ADHD)
- Further understanding of how pupil diameter measures attention
- Improvement of student learning in education

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