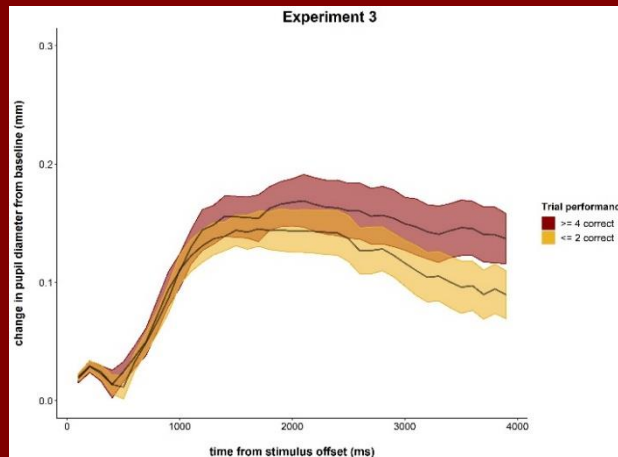
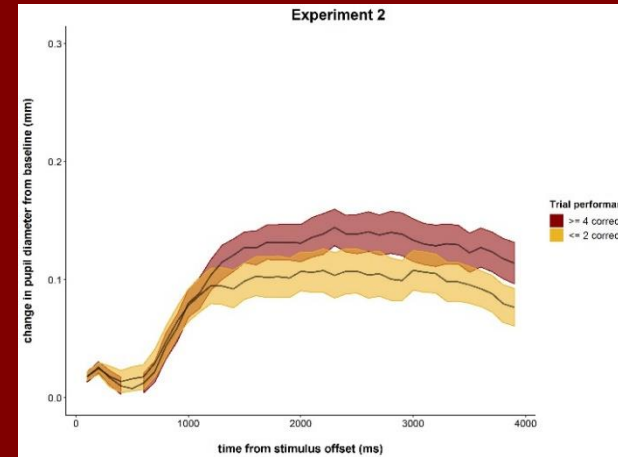
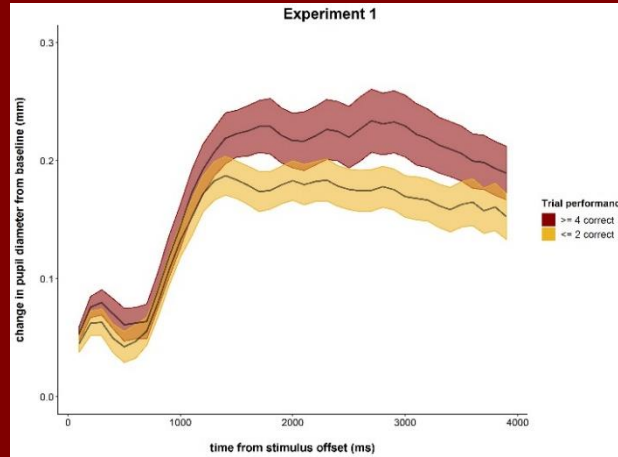
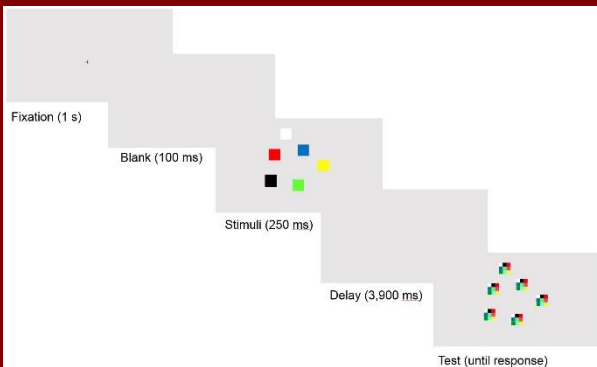


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Background & Method

- Recent research has shown that contralateral delay activity (CDA) can track the relative success of working memory maintenance (Adam et al., 2018)
- Research has also shown that the pupil dilates over delay intervals in working memory tasks (Kahneman & Beatty, 1966)
- Can we use pupillometry to track working memory performance on a trial-by-trial basis?
- In Experiments 1 and 2, participants completed 80 trials of a discrete whole-report task, and they were asked to report their attentional state after 8 random trials
- In Experiment 3, participants received the thought probes after 8 random trials and after any trial in which they reported 0 or 1 items correctly
- Pupil diameter continuously recorded throughout the task



Regression on mean number correct

Predictor	<i>b</i>	<i>t</i> (102)	<i>p</i>
Pretrial pupil mean	.05	.85	.40
Pretrial pupil <u>CoV</u>	-11.78	-3.62	<.001
TEPR mean	.07	1.10	.27
TEPR <u>CoV</u>	-.03	-1.43	.16

Note. CoV = coefficient of variation; TEPR = task-evoked pupillary response.

Thought probes

- I am totally focused on the current task,
- I am thinking about my performance on the task,
- I am distracted by sights/sounds in my environment,
- I am intentionally thinking about things unrelated to the task,
- I am unintentionally thinking about things unrelated to the task,
- My mind is blank

Responses to thought probes

Response	Catch probe	Standard probe
On-task	.27 (.33)	.36 (.34)
TRI	.26 (.23)	.32 (.27)
ED	.03 (.09)	.01 (.03)
Intent. MW	.05 (.14)	.02 (.06)
Unintent. MW	.20 (.22)	.16 (.18)
Mind-blanking	.18 (.26)	.13 (.27)
Off-task (total)	.47 (.34)	.32 (.32)

Note. TRI = task-related interference, ED = external distraction, Intent. MW = intentional mind-wandering, Unintent. MW = unintentional mind-wandering.

- In all 3 experiments, the pupil dilated to a greater extent when participants held more items in memory
- Participants reported fewer items correctly when they reported being in an 'off-task' attentional state
- Participants who experienced more variability in arousal (pretrial pupil diameter) performed worse on the task
- Results are consistent with the LC-NE account of individual differences in working memory capacity and attention control (Unsworth & Robison, 2017)

*Robison, M. K., & Unsworth, N. (In press). Pupillometry tracks fluctuations in working memory performance. *Attention, Perception, & Psychophysics*.

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