How Do Mind-Wandering, Cognitive Load, and Environment Affect Working Memory?

KELLY COTTON[1] & TIMOTHY J. RICKER[2]

[1] THE GRADUATE CENTER, CITY UNIVERSITY OF NEW YORK [2] UNIVERSITY OF SOUTH DAKOTA

Contact: kcotton@gradcenter.cuny.edu

Mind-wandering, cognitive load, and experimental environment have independently been shown to impact performance.

Both mind-wandering and cognitive load affect working memory performance, but there may be performance differences in basic cognitive tasks depending on context.

- Self-reported mind-wandering impairs visual working memory performance (Krimsky et al., 2017)
- Higher cognitive load impairs performance (Barrouillet, et al. 2004)
- Basic attention paradigms show similar patterns of performance both in-person and online (Crump et al., 2013)
- Sparse research directly comparing working memory performance in-person and remotely, though some research suggests worse performance at home (e.g., Xu et al., 2017)

Predictions

- Higher cognitive load leads to task disengagement and increased mind-wandering
- Participants who report more mind-wandering will have worse working memory performance
- Online participants will have even higher rates of mind-wandering and worse task performance

Experimental context may affect working memory accuracy or mind-wandering, but the effect of cognitive load on mind-wandering is unclear.

Cognitive load and accuracy

- No main effect of cognitive load (BF_{10} = .002)
- Ambiguous main effect of context & interaction effect (BF_{10} = .43, .50)

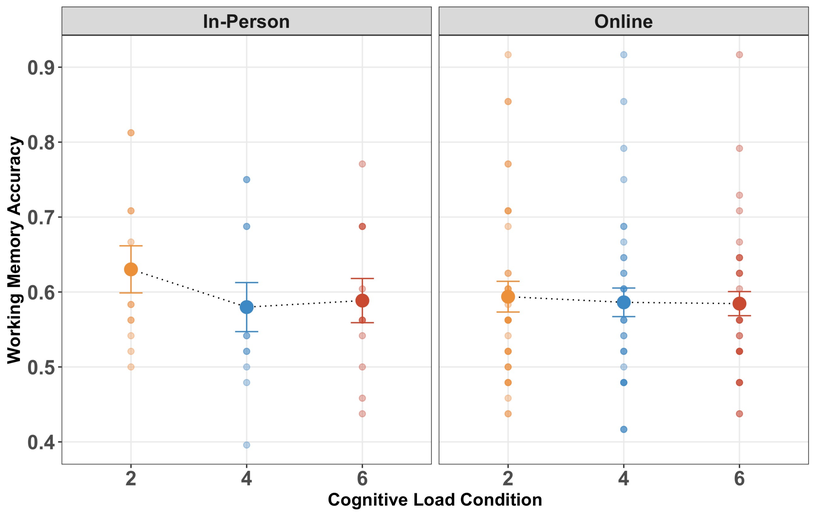

Figure 2. *Cognitive load effect on working memory accuracy. Error bars represent standard error.*

Cognitive load and mind-wandering

- Ambiguous main effect of cognitive load & context (BF_{10} = 1.4, .43)
- Ambiguous interaction effect (BF_{10} = .50)

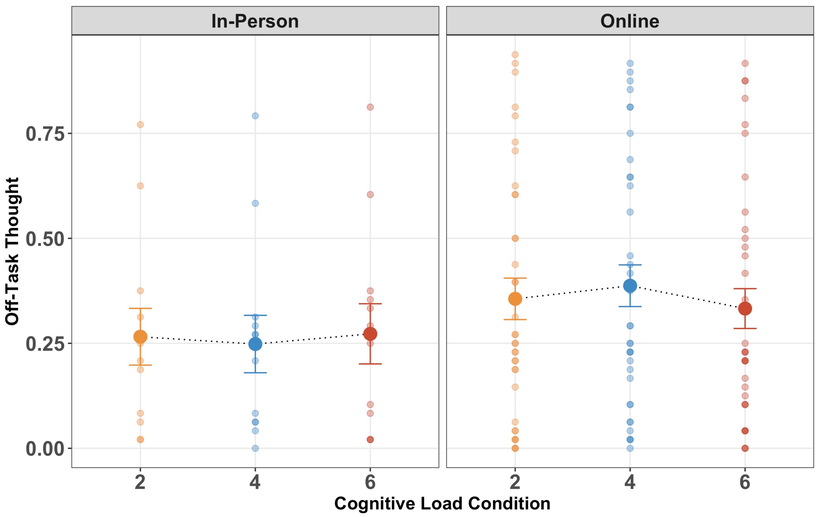

Figure 3. *Cognitive load effect on mind-wandering. Error bars represent standard error.*

Current (Ongoing) Study Methods

Participants Online context *N* = 43 (4 removed), in-person context *N* = 12

Procedure

- 144 trials
- Single-item probe change detection task
- Parity judgement (2, 4, or 6 items)
- Mind-wandering probe every trial
- At end, Mindful Attention Awareness Scale

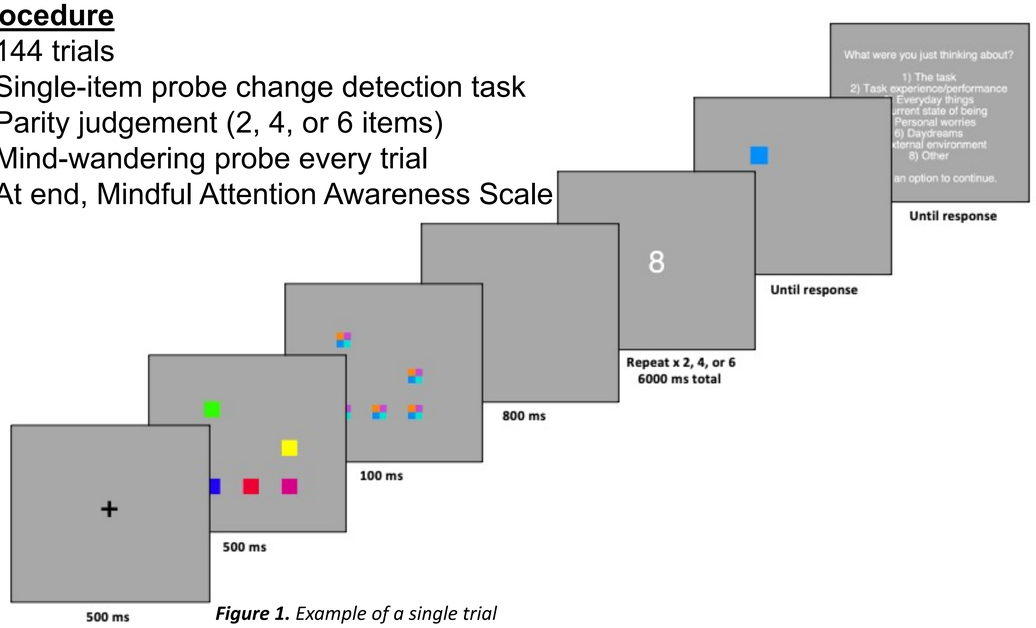

Figure 1. *Example of a single trial*

Self-reported mind-wandering rates may correlate with working memory accuracy.

Overall mind-wandering across contexts

- Online reported off-task thought in 39% of all trials
- In-Person reported off-task thought in 26% of all trials

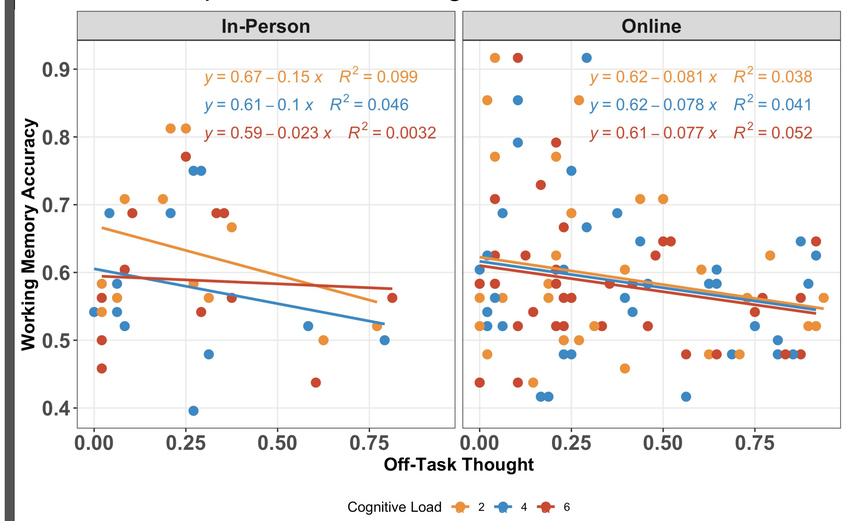

Figure 4. *Mind-wandering rate vs. working memory accuracy.*

The results are inconclusive as to the effects of cognitive load and experimental context on mind-wandering and working memory.

Poor performance overall on the task likely confounds potential effects.

- In all cognitive load conditions and experimental contexts, participants performed slightly above chance.
- The task may have been too difficult.

Online participants reported more mind-wandering compared to in-person participants.

- Small sample sizes may contribute to unclear statistical results.

Ambiguous findings underscore need for more data.

- Data collection is ongoing.

Thank you to Joshua Sandry for in-person data collection.