Saving Important Material: An Examination of Offloading, Memory, and Metacognition

Ashley J. Berdelis, Morgan D. Shumaker, & Sarah K. Tauber
Texas Christian University

Contact: m.shumaker@tcu.edu

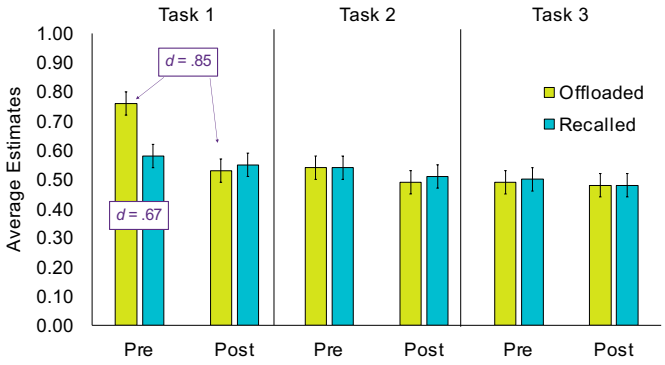
Background

- The agenda-based regulation (ABR) framework posits that learners assess task constraints prior to study and construct an agenda that aims to achieve the task goal within these constraints.[1]
- Cognitive offloading involves saving material to an external store to extend memory beyond what one can maintain in one's head at the time.[2] Prior work has found that task goals influence learners' decisions about *what* and *when* to offload.[3]
- When our external store becomes inaccessible, memory for offloaded material is impaired, compared to memory for material that one has stored internally (i.e., remembered).[4]

Research Questions

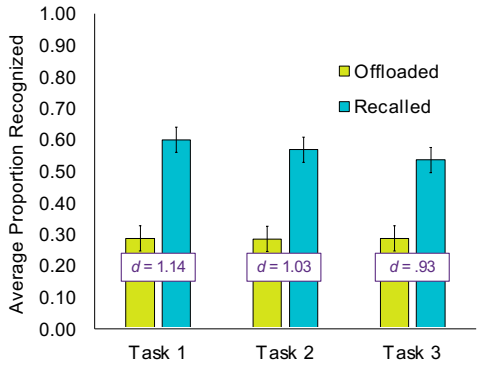
- **How does the value (importance) of the to-be-learned material influence offloading behavior?[5]**
- **How does memory for offloaded items compare to memory for recalled (not-offloaded) items?**
- **Do learners adjust their knowledge about cognitive offloading and memory, and can they transfer this knowledge to other, similar tasks?**

Average Pre- and Post-task Estimates for Offloaded and Recalled Items on the Recognition Test



*Error bars represent standard error

Recognition Performance for Offloaded and Recalled Items



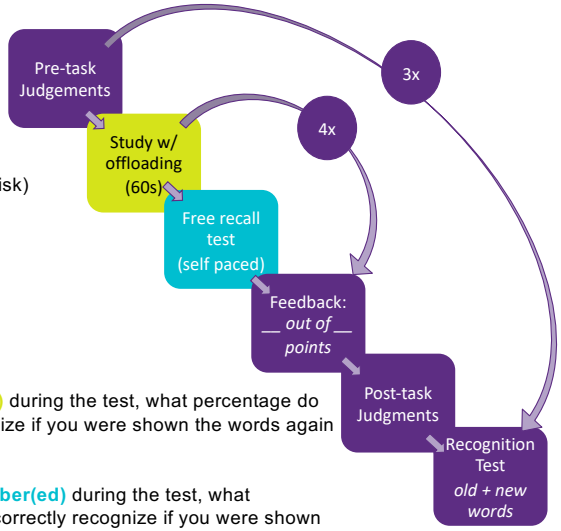
*Error bars represent standard error

Method

N = 44 TCU undergrads
Values: High/Low

Tasks: *Counterbalanced order*
Vocabulary test (3 or 12 points)
Side effects (**bold** or not bold)
Crime scene (asterisk* or no asterisk)

Stimuli:
4 lists per task
16 words per list
*Option to offload 4 words per list



Judgments:
Of the words you are able to **save(d)** during the test, what percentage do you think you would correctly recognize if you were shown the words again (0 – 100)?

Of the words you are able to **remember(ed)** during the test, what percentage do you think you would correctly recognize if you were shown the words again (0 – 100)?

Conclusions

- Value guided offloading behavior such that participants offloaded more high-value than low-value items
- Participants correctly recognized more previously recalled items than offloaded items on the final tests, suggesting that offloading leads to downstream consequences in memory for those offloaded items compared to memory for recalled items.
- Participants adjusted their judgments after experience with the first task and transferred their metacognitive knowledge to the remaining two tasks; however, participants' updated knowledge for offloaded words remained inconsistent with recognition performance after three tasks.

References

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2. Hamilton, K. A., & Benjamin, A. S. (2019). The human-machine extended organism: New roles and responsibilities of human cognition in a digital ecology. Journal of Applied Research in Memory & Cognition, *8*, 40-45.
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4. Grinschgl, S., Papenmeier, F., & Meyerhoff, H. S. (2021). Consequences of cognitive offloading: Boosting performance but diminishing memory. *Quarterly Journal of Experimental Psychology*, *74*(9), 1477-1496.
5. Middlebrooks, C. D., & Castel, A. D. (2018). Self-regulated learning of important information under sequential and simultaneous encoding conditions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *44*(5), 779.