



Error Generation and Learning: Feedback Timing Complexities and Warning Conditions



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Background

Feedback timing affects learning from generation/ retrieval practice.¹
 The effect of feedback timing depends on generation/ retrieval accuracy during practice.²

- Immediate feedback improves learning from errors.
- Delayed feedback improves memory for correct responses.

Research Question

Why is immediate feedback typically better than delayed feedback for learning from errors?

Experiments 1 and 2: We tested two non-mutually exclusive benefits of immediate feedback:

1. Immediately finding out your response was incorrect
2. Immediately studying the correct answer after a retrieval attempt

Experiment 2: Is immediate feedback beneficial because it allows participants to link their error to the answer?

- Mediation or “errors as stepping stones” hypothesis³
- cue→error→answer could create an additional retrieval route and reduce interference on the final test.

Materials

40 weakly related word pairs
 Learned and tested in two blocks of 20

swim - float
coffee - morning
river - canoe

Methods

Experiment Design

- 2 (Initial Accuracy; within) x
 • Deemed Correct vs. Deemed Incorrect
 • Only analyzing deemed incorrect here
- 2 (Feedback Timing; within) x
 • Immediate vs. Delayed
- 2 (Warning; between)
 • Yes vs. No
 • Only pertains to delayed feedback trials
 • Immediate feedback trials were identical for participants in the warning and no warning conditions

➔ Reporting data here as 3 conditions: Immediate (IMM), Delayed with Warning (DW), Delayed with No Warning (DNW)

Procedure

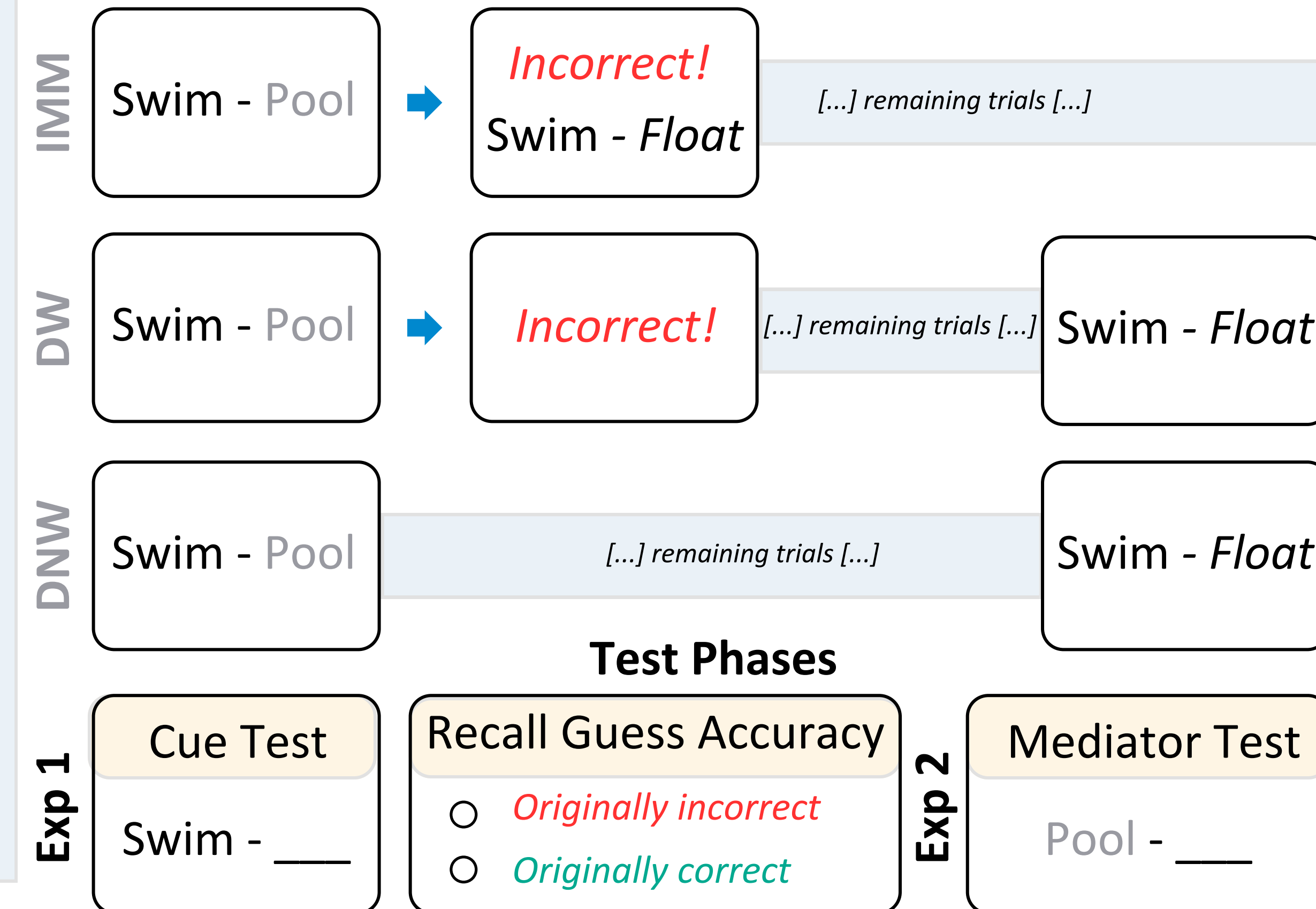
Block 1

1. Study items 1-20
 - All immediate feedback
2. 5-minute distractor
3. Test with original cue (Ex. 1) or original guess as cue (Ex. 2)

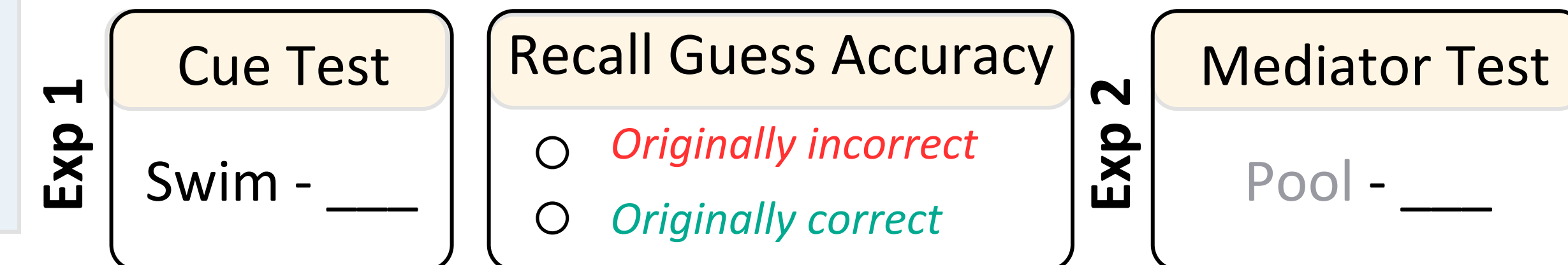
Block 2

- Repeat steps 1-3 with items items 21-40
- All delayed feedback
 - Warning vs. No Warning manipulated between subjects
- Block order was counterbalanced; items were randomly assigned to blocks

Study Phase Conditions



Test Phases



Discussion

Conclusions

We did not replicate the benefits of immediate feedback over delayed feedback for learning from errors.

Experiment 1: Learning from feedback was similar regardless of whether a warning was provided immediately after an error.

Cued recall was quite high (about 85%).

- Ceiling effect?
- Weak manipulation of feedback timing?
 - Maximum 5 minute delay.
- Was delayed feedback similarly effective as immediate feedback because it was relatively easy to recall one’s original guess during delayed feedback?

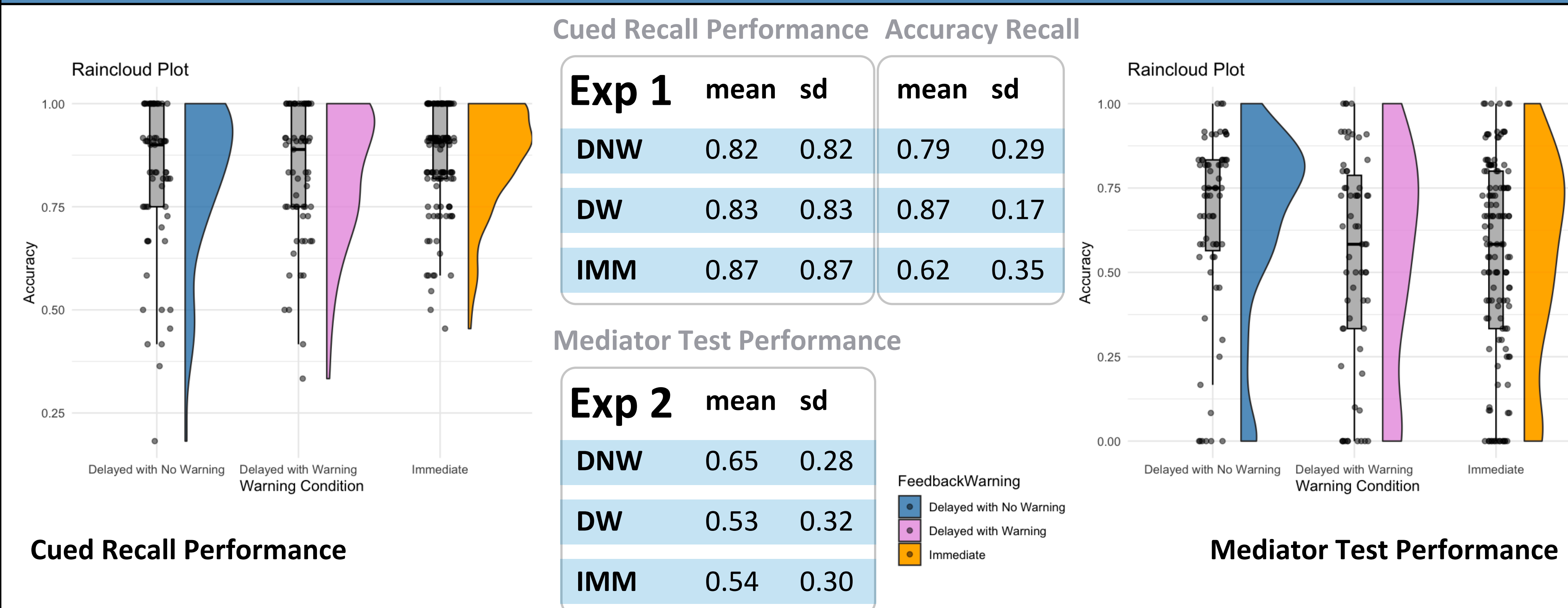
Experiment 2: Learning was best in the No Warning condition.

Were participants potentially confused by their original guess as the final test cue?

Ongoing & Future Research

- Ex. 3: Warning accompanying delayed feedback.
- Replicate studies with longer delay and lower overall performance.

Results



References

¹Vaughn, K. E., & Rawson, K. A. (2012). When is guessing incorrectly better than studying for enhancing memory?. *Psychonomic Bulletin & Review*, 19, 899-905. ²Nepangue & Hausman (2023). Poster #5173. ³ Cyr, A. A., & Anderson, N. D. (2015). Mistakes as stepping stones: Effects of errors on episodic memory among younger and older adults. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 41(3), 841.

Abstract

This study investigates the complexities of learning from errors and considers influences of feedback timing. Previous research suggests that immediate feedback is essential for benefiting from errors. Is immediate feedback beneficial because it immediately alerts learners of their error, or because the immediate feedback is corrective? Participants learned weakly associated word pairs under errorless (e.g., swimfloat) and errorful (e.g., swim-???) conditions, with either immediate feedback, delayed feedback, or delayed feedback with immediate warnings. Within errorful trials, participants either 1) guessed the target then studied the immediately-provided correct answers, 2) guessed all targets before studying the delayed correct answers, or 3) received immediate warnings concerning the correctness of their guesses, later followed by delayed feedback. Delayed feedback, even when accompanied by immediate warnings, did not produce as much learning from errors as immediate feedback. Results will be discussed in terms of spacing, theories of error correction, and memory updating.