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Background

From the dual-process perspective, performance on recognition tests is based on both *recollection* (re-experiencing initial encounter with material) and *familiarity* ("gut feeling" without re-experiencing)¹.

Prior research has found that, with short delays between initial and final tests, testing enhances the use of recollection, but not familiarity^{2,3}.

The magnitude of the testing effect and estimates of recollection and familiarity have been shown to change over time, so the mechanisms responsible for the testing effect at delays > 15 min remain uncertain.

This project examines how initial testing affects later reliance on recollection and familiarity over long delays (up to 4 days), in order to better understand the mechanisms that underly the testing effect.

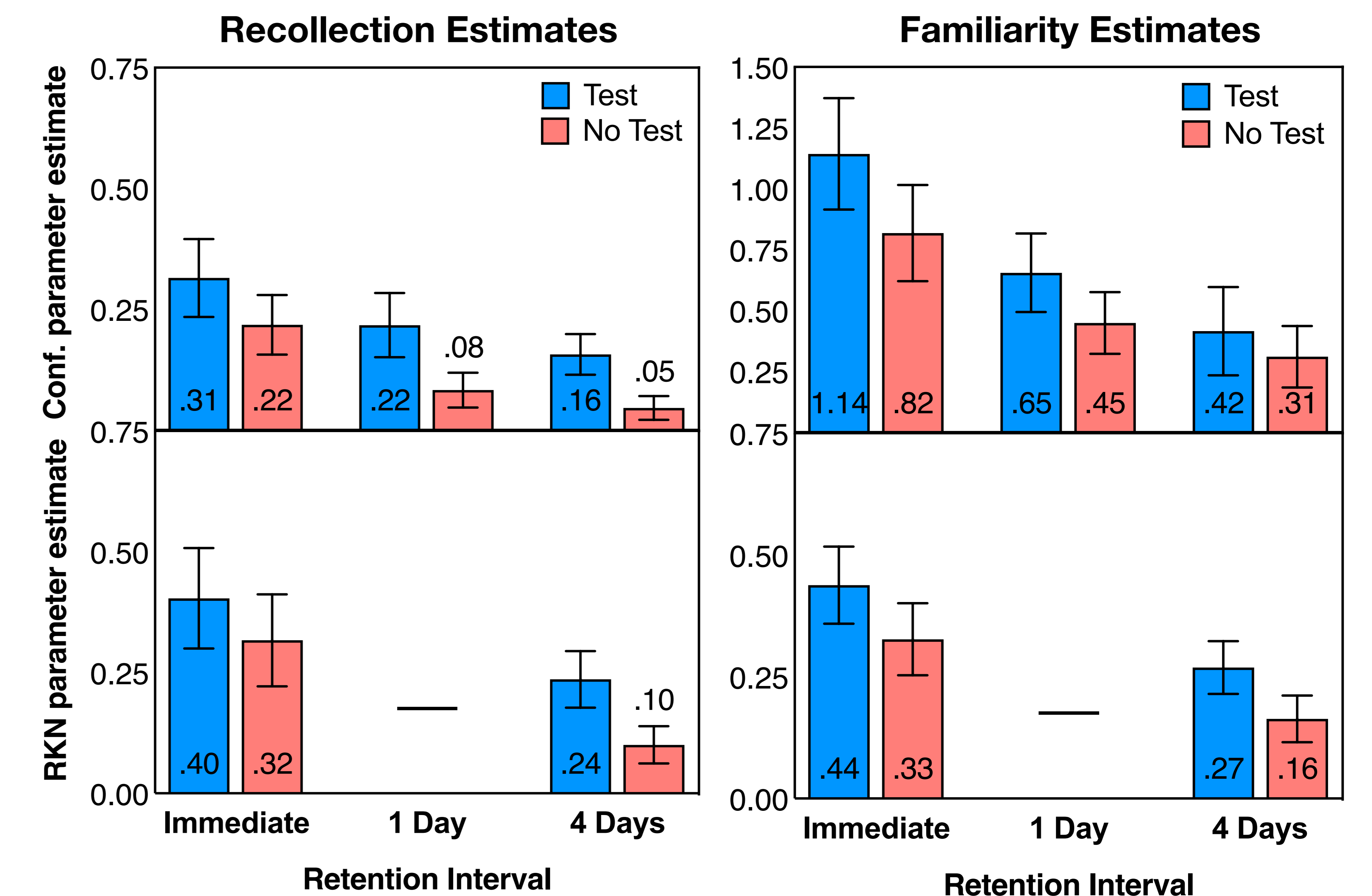
Participants correctly answered ~1/3 of initial test items.

Initial Cued-Recall Accuracy

	~2 Minutes		~1 Day		~4 Days	
	Test 1	Test 2	Test 1	Test 2	Test 1	Test 2
Conf.	0.31 (0.04)	0.37 (0.04)	0.26 (0.03)	0.31 (0.04)	0.29 (0.04)	0.33 (0.04)
RKN	0.32 (0.04)	0.35 (0.03)	-	-	0.27 (0.04)	0.36 (0.04)

Mean Proportion Correct (Standard Error)

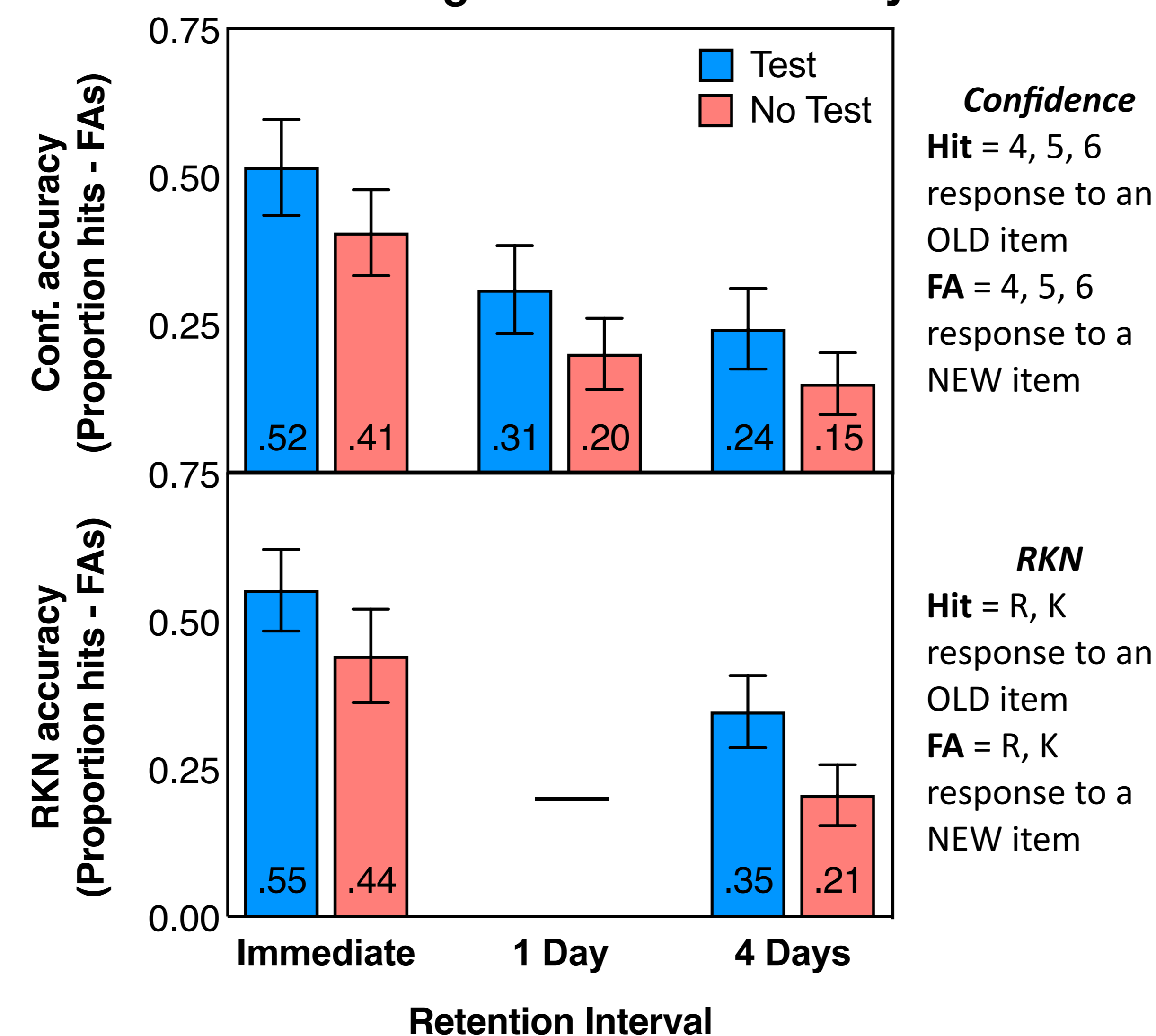
Both recollection and familiarity estimates showed a testing effect at all retention intervals.



Error bars = 95% CI

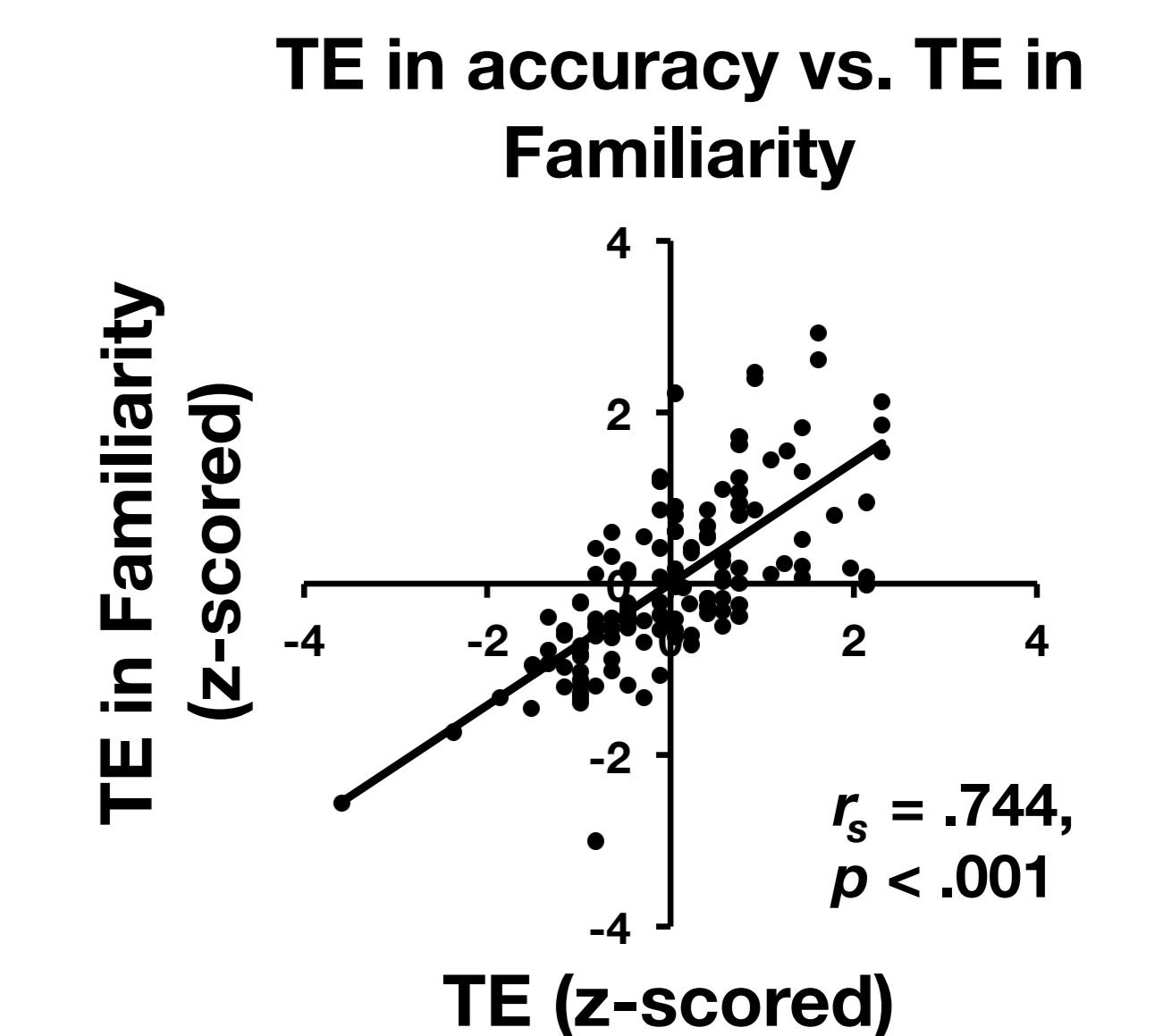
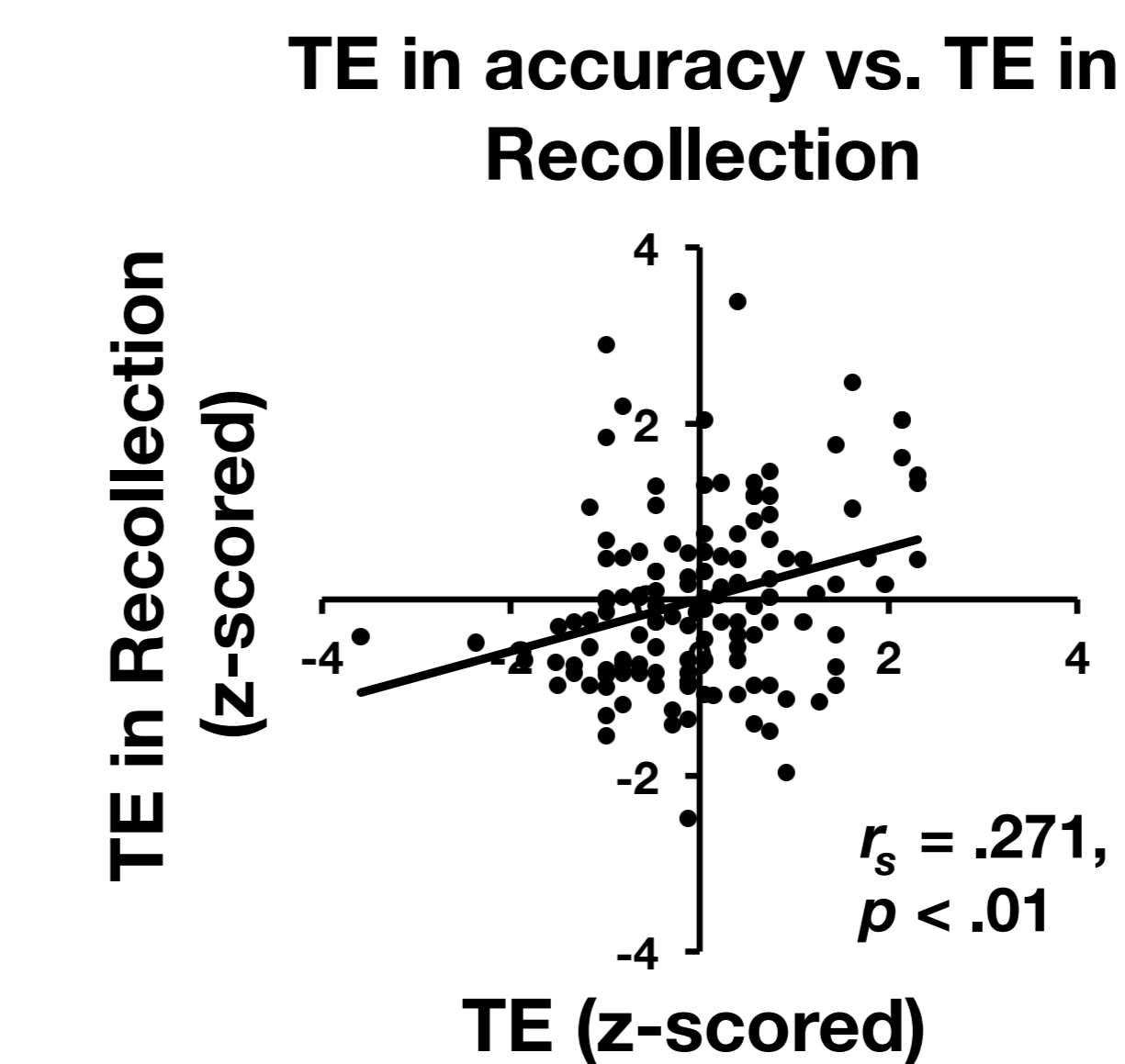
Final tests indicated a testing effect at all retention intervals and criterial tests.

Final Recognition Test Accuracy



Error bars = 95% CI

In addition, individual differences in the degree of the testing effect (TE) in accuracy correlated with individual differences in the degree of the TE in both recollection and familiarity estimates.



Methods

Participants from Amazon Mechanical Turk

Included: N = 135 (62 F, mean age = 40.0 yrs)

Excluded during or following task: N = 66

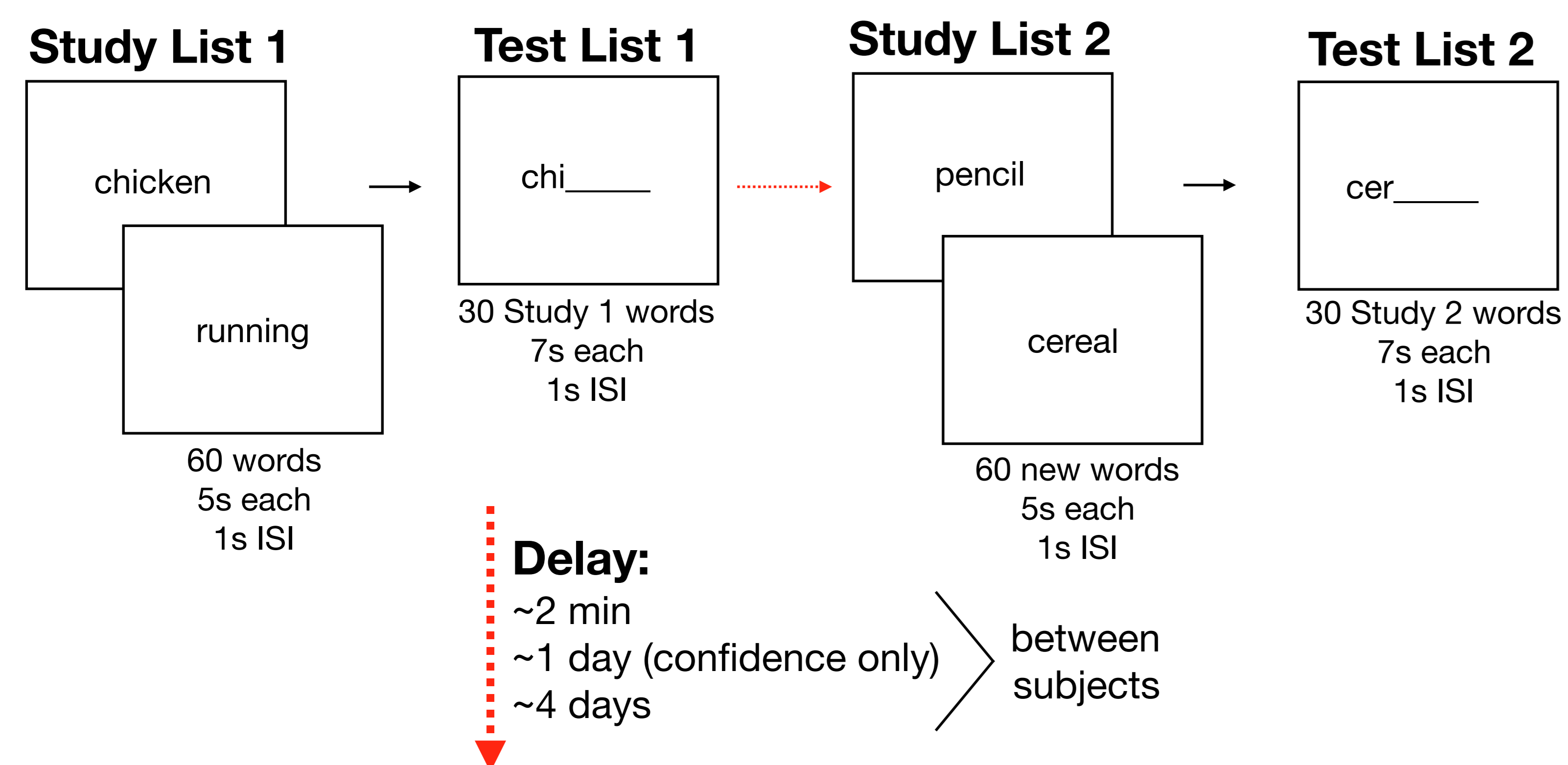
E.g. reported disorder, noted words, vision problems, etc.

Excluded prior to main task: N = 54 (failed Remember-Know training; 1 vision)

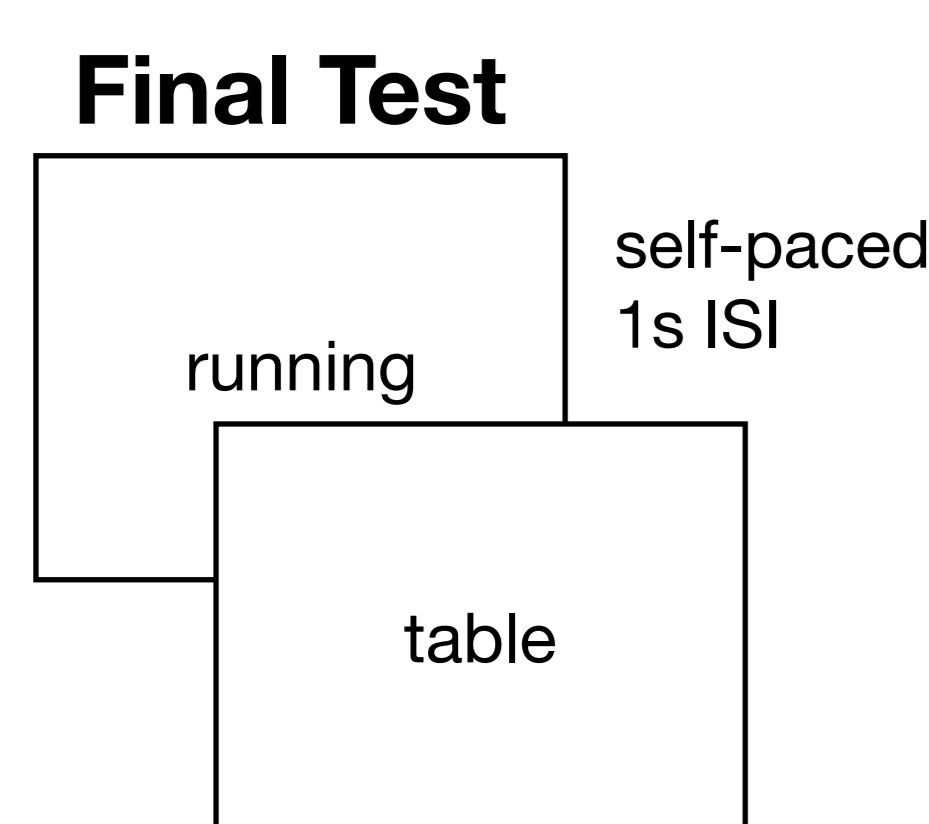
E.g. example "know": "i know i saw the word cookie the other day at luchn [sic]"

Two Phases:

Initial learning: Participants study 120 words and take cued-recall tests on half of the words



Final test: Participants take a recognition test, consisting of 120 old and 120 new, non-presented words



Criterial Test

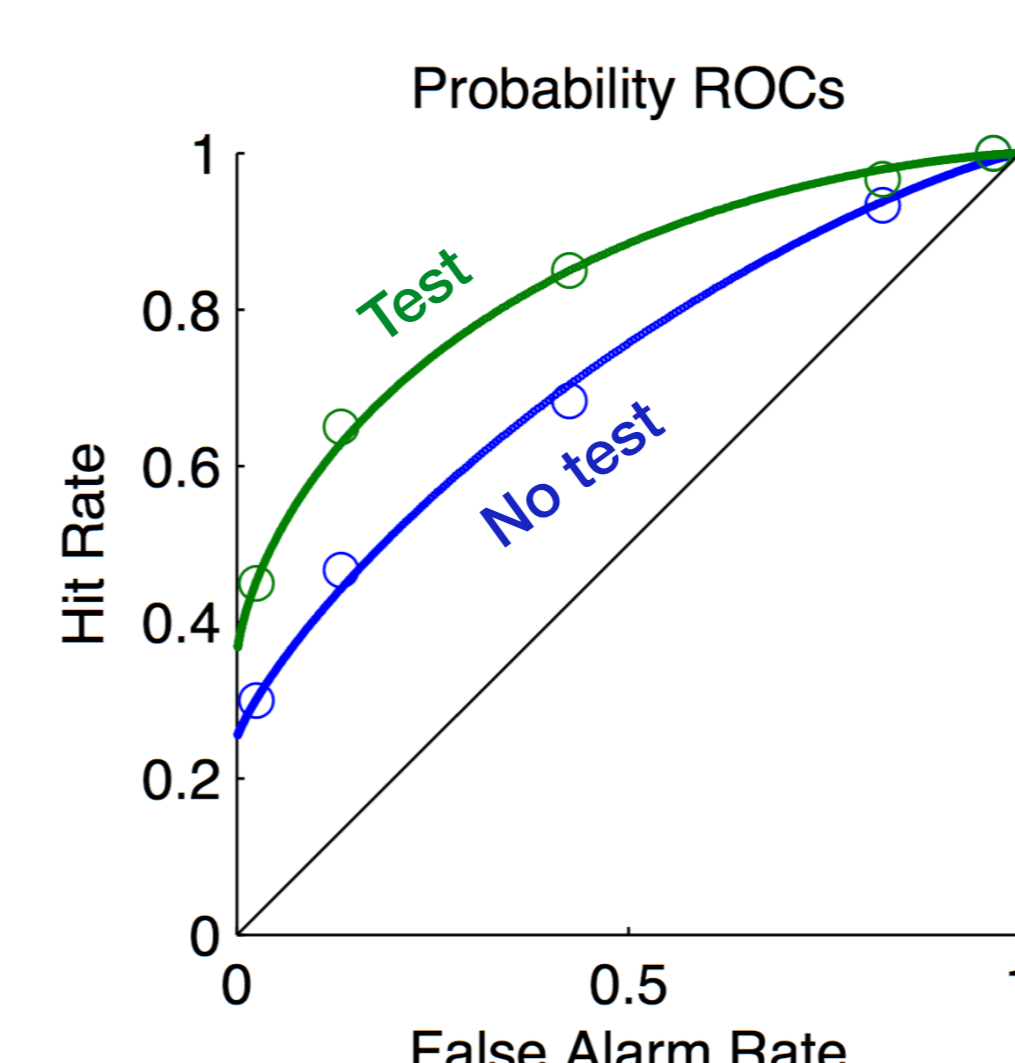
Confidence
1 - 2 - 3 - 4 - 5 - 6
Sure new Sure old

Remember-Know Paradigm
R - K - N

between subjects

Recollection and familiarity were estimated on the final test in two ways.

Confidence data fit to Dual-Process Signal Detection model⁴



Independence Remember-Know Procedure^{1,5}

Recollection

Hit(Remember) - FA(Remember)

Familiarity

Hit(Know) - FA(Know)
1 - Hit(Remember) - 1 - FA(Remember)

Conclusions

Contrary to prior findings using short retention intervals, we find that the benefit of testing can be due to changes in both recollection and familiarity at all retention intervals examined (~2 minutes to ~4 days).

Future research will seek to bridge the gap between prior literature and these findings, in order to constrain the role of familiarity in the effect.

Of particular interest is how differences in initial test type, method of obtaining parameter estimates, and degree of the testing effect interact with retention interval to influence the role of familiarity in the effect.

References

- Yonelinas (2002) *Journal of Memory and Language*
- Chan & McDermott (2007) *J. Exp. Psychol.: Learning, Memory, and Cognition*
- Verkoeijen et al. (2011) *Experimental Psychology*
- Koen et al. (2016) *Behavior Research Methods*
- Yonelinas & Jacoby (1995) *Journal of Memory and Language*

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