Contiguity in Episodic Memory

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What is Temporal Contiguity?

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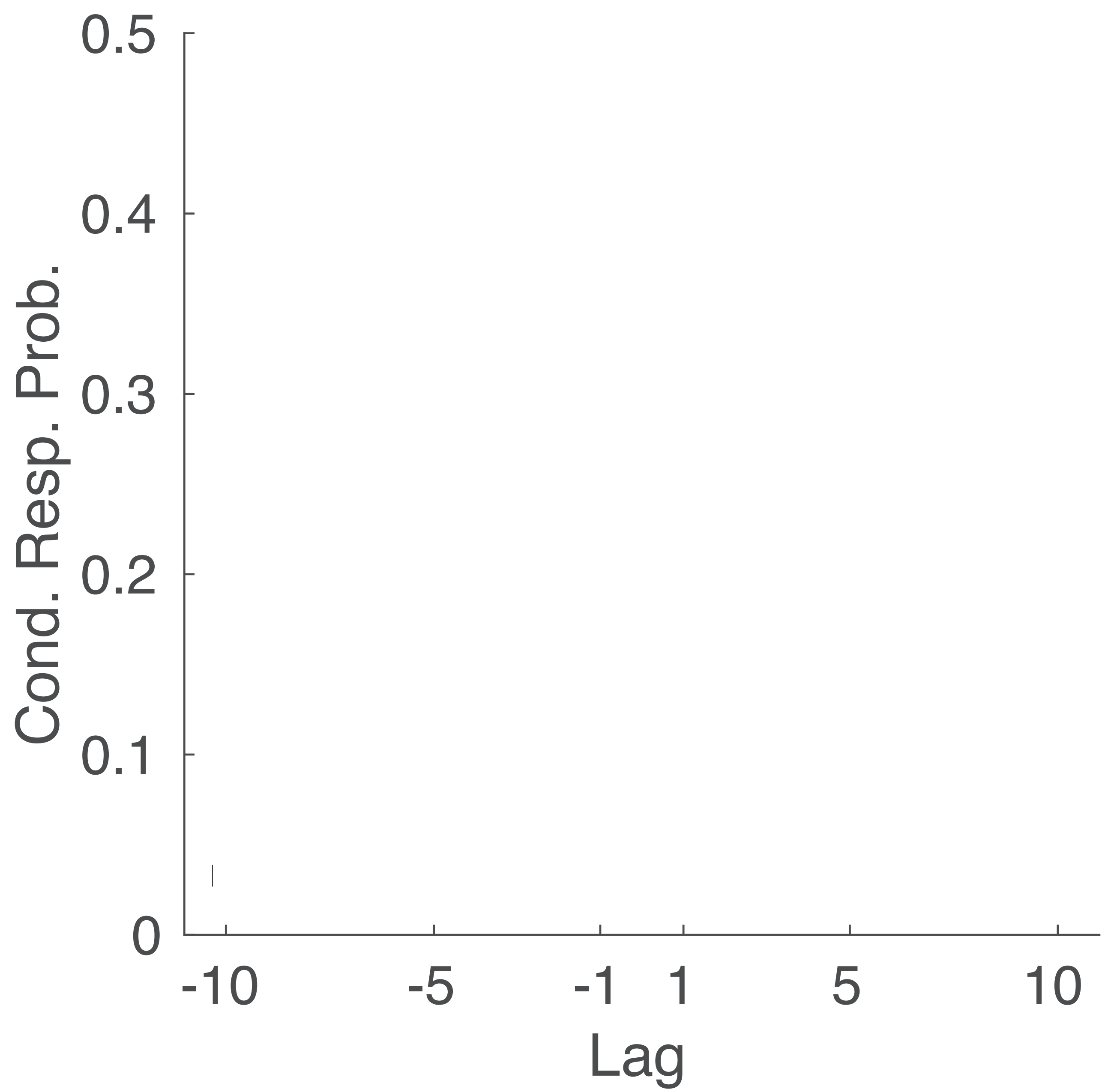
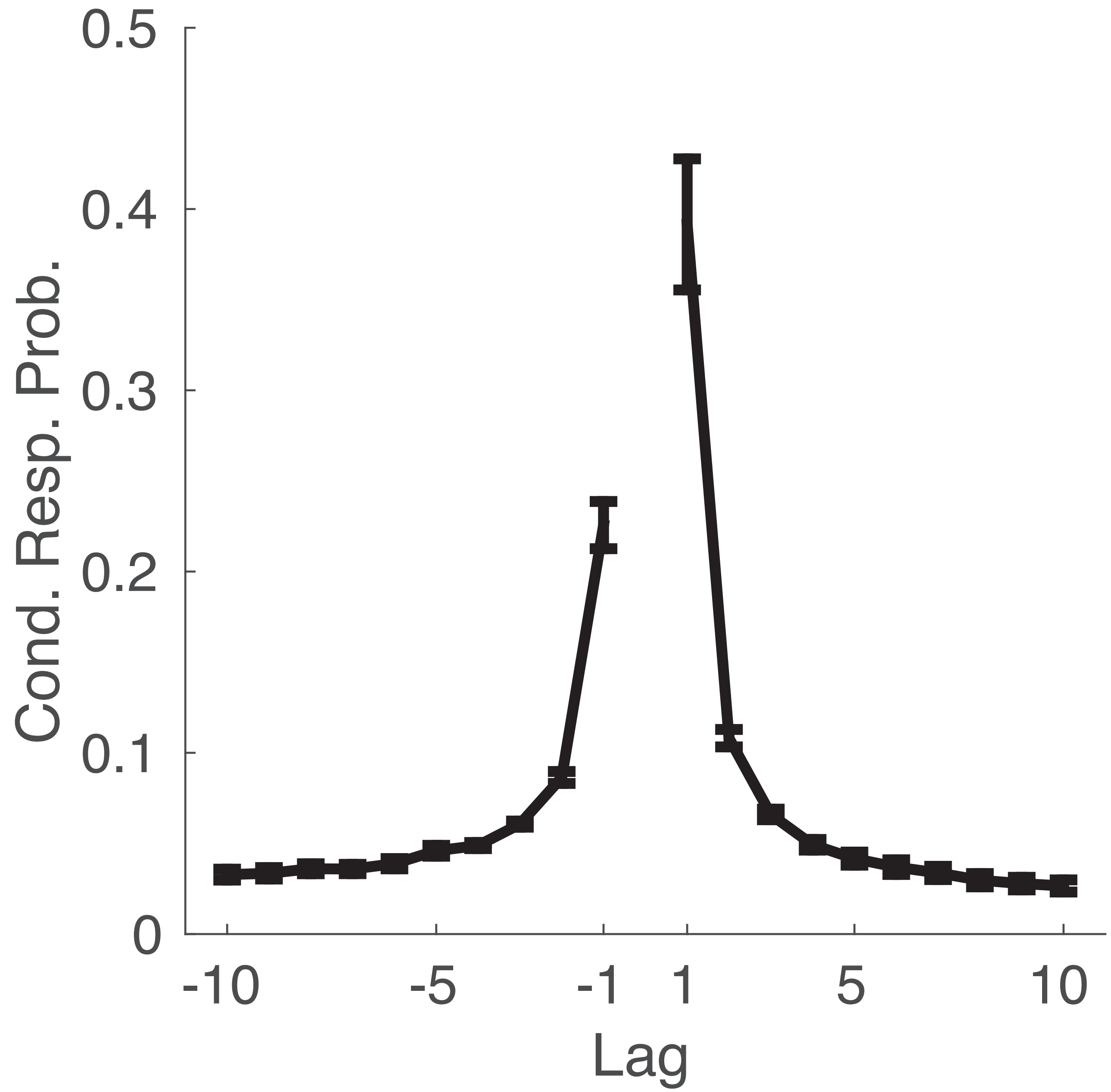
- Recalling one event, *i*, tends to trigger recall of an another event that occurred near in time to *i*

Temporal Contiguity



Kahana (1996)
Healey & Kahana (submitted)

Temporal Contiguity



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Why does temporal contiguity influence memory search?

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- It is a trick of the short time scale of free recall (STM buffer)
- It is a trick of the peculiarities of free recall (task-specific strategies)

Two Questions

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1. Is the effect easy to break?

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2. Does the effect depend on timescale?

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Table C1

References for benchmark contiguity effects.

Effect	Originally reported in	Figure or Page in current manuscript	Shown/Replicated in current manuscript with data from
Contiguity in immediate free recall	Kahana (1996)	Figure 1A	PEERS
Forward asymmetry	Kahana (1996)	Figure 1A	PEERS
Ubiquity across individuals	Healey & Kahana (2014)	Page 17	PEERS
Changes across the lifespan	Kahana et al. (2002)	Figure 2B	PEERS
Positive correlation with recall	Sederberg et al. (2010)	Figure 3A	PEERS
Positive correlation with IQ	Healey, Crutchley, & Kahana (2014)	Figure 3B	PEERS
Present from first list to 24^{th} session	Current Manuscript	Figure 2D&E	PEERS
Immune to variation in goodness of encoding	Current Manuscript	Figure 4	Murdock (1962); PEERS
Higher for early and late output positions	Kahana (1996)	Figure 2F	PEERS
Consistent across serial positions	Current Manuscript	Figure 2G	PEERS
List Length	Current manuscript	Figure 2H	Murdock (1962)
Presentation Modality	Current manuscript	Figure 2I	Murdock & Walker (1969)
Recall Modality	Current manuscript	Figure 2J	Murdock & Walker (1969); Murdock (1962)
Encoding Task	Long & Kahana (2016)	Figure 2K	PEERS
Approximate time-scale invariance	Howard & Kahana (1999)	Figure 2L	PEERS
Robust to very fast presentation rates	Howard (2016)	Page 28 & Figure 2M	Murdock & Walker (1969)
Robust to very slow presentation rates	Nguyen & McDaniel (2015)	Page 29 & Figure 2M	Murdock & Walker (1969)
Present in same-category lists	McCluey et al. (2016)	Figure 2N	reproduced from McCluey et al. (2016)
Absent in orthographically distinct lists	McDaniel et al. (2011)	Page 30	-
Present when semantic associates compete	Current Manuscript	Figure 2O	PEERS
Present when list includes emotional items	Siddiqui & Unsworth (2011)	Page 31	-
Robust to variation in stimuli complexity	Nguyen & McDaniel (2015)	Page 32	-
Present when items vary in assigned value	Stefanidi & Brewer (2015)	Page 33	-
Absent when subjects do not intend to encode	Nairne et al. (submitted)	Figure 6	Current Manuscript
Contiguity in FR intrusions	Zaromb et al. (2006)	Page 38	-
Across-list contiguity in final free recall	Howard et al. (2008); Unsworth (2008)	Figure 7	PEERS
Contiguity in SR errors	Klein et al. (2005)	Page 41	-
Compound cuing in recognition	Schwartz et al. (2005)	Page 42	-
Contiguity in PA intrusions	Davis et al. (2008)	Page 44	-
Contiguity in autobiographical memory	Moreton & Ward (2010)	Page 45	-

PEERS = Penn Electrophysiology of Encoding and Retrieval Study (Healey, Crutchley, & Kahana, 2014; Healey & Kahana, 2014, 2016; Lohnas & Kahana, 2013, 2014a; Miller et al., 2012).

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Healey & Kahana (submitted)

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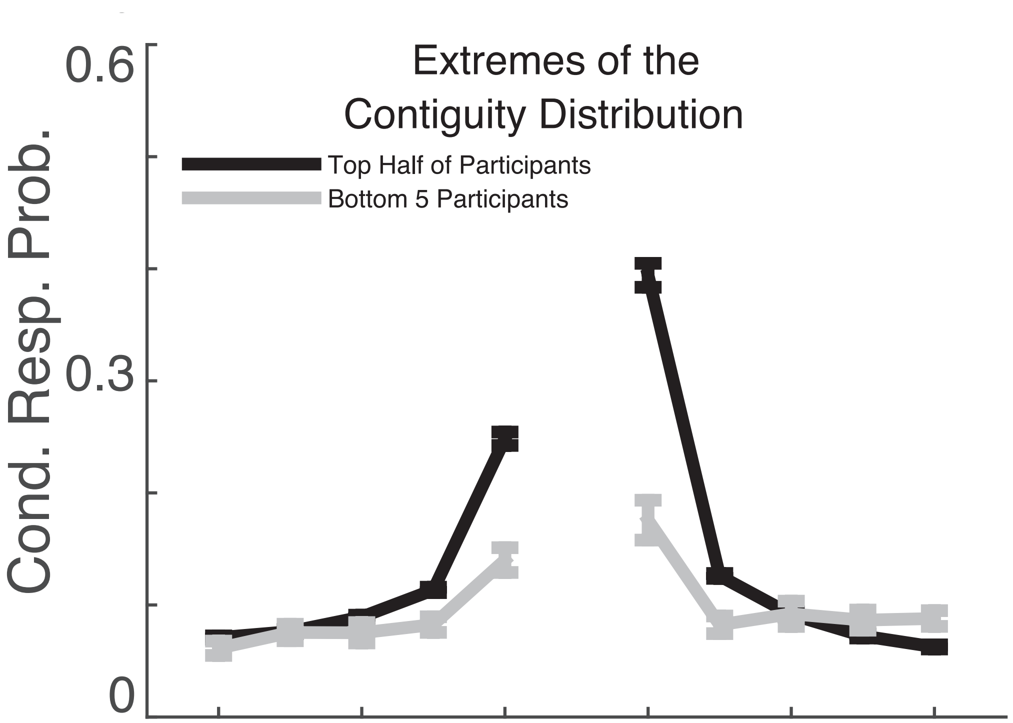

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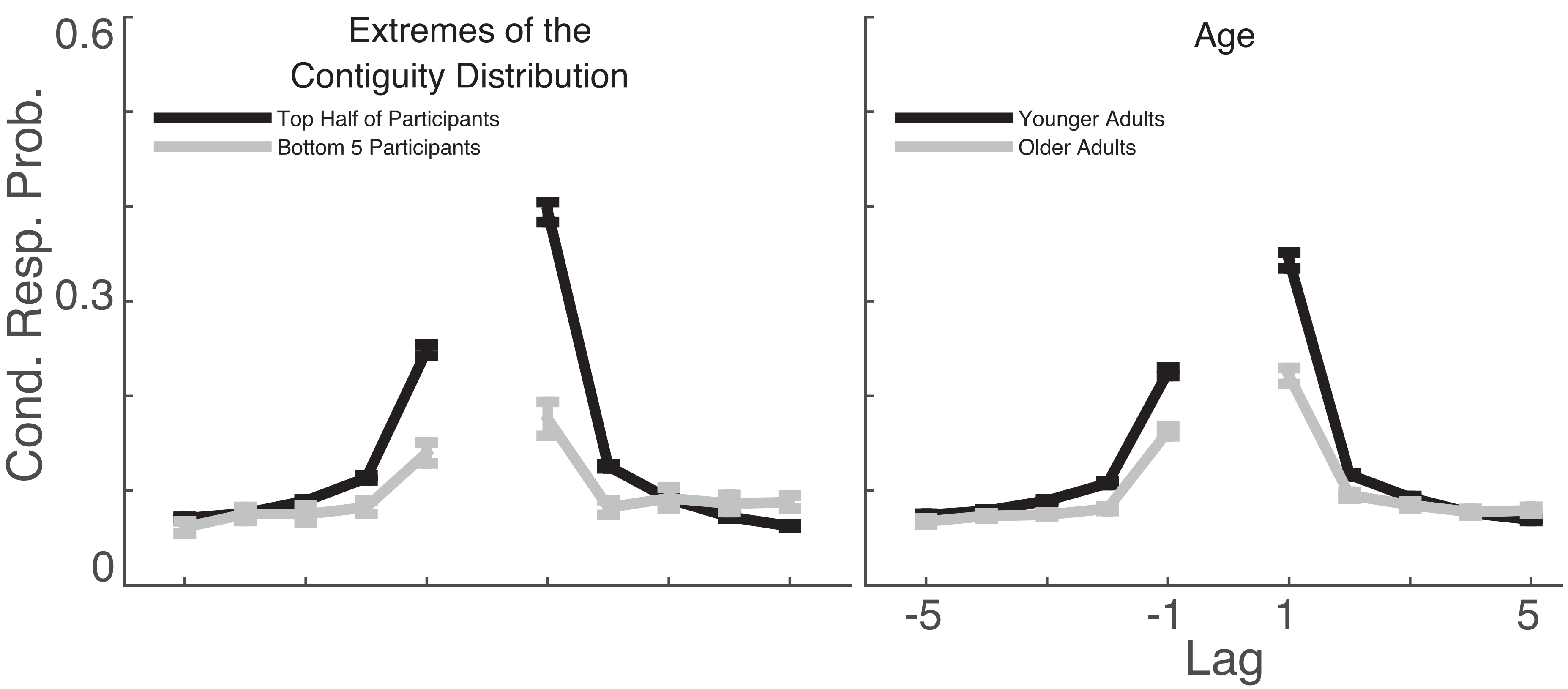

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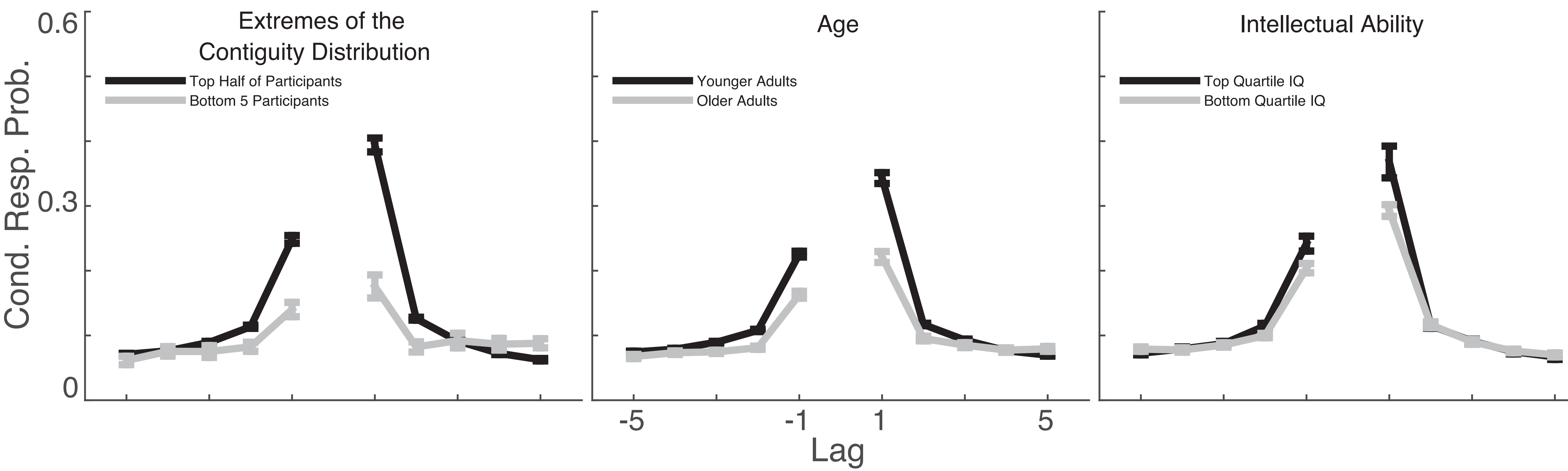

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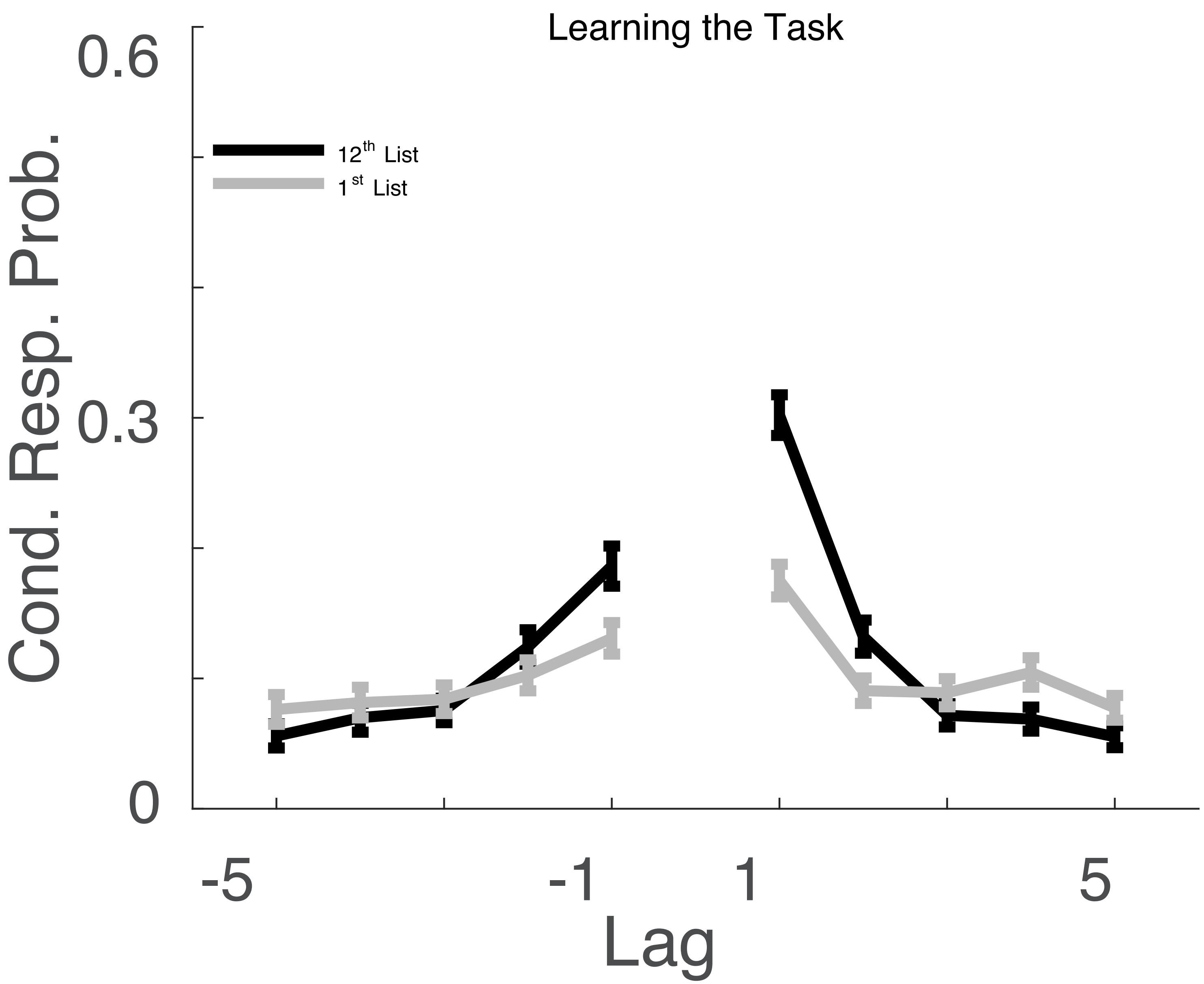

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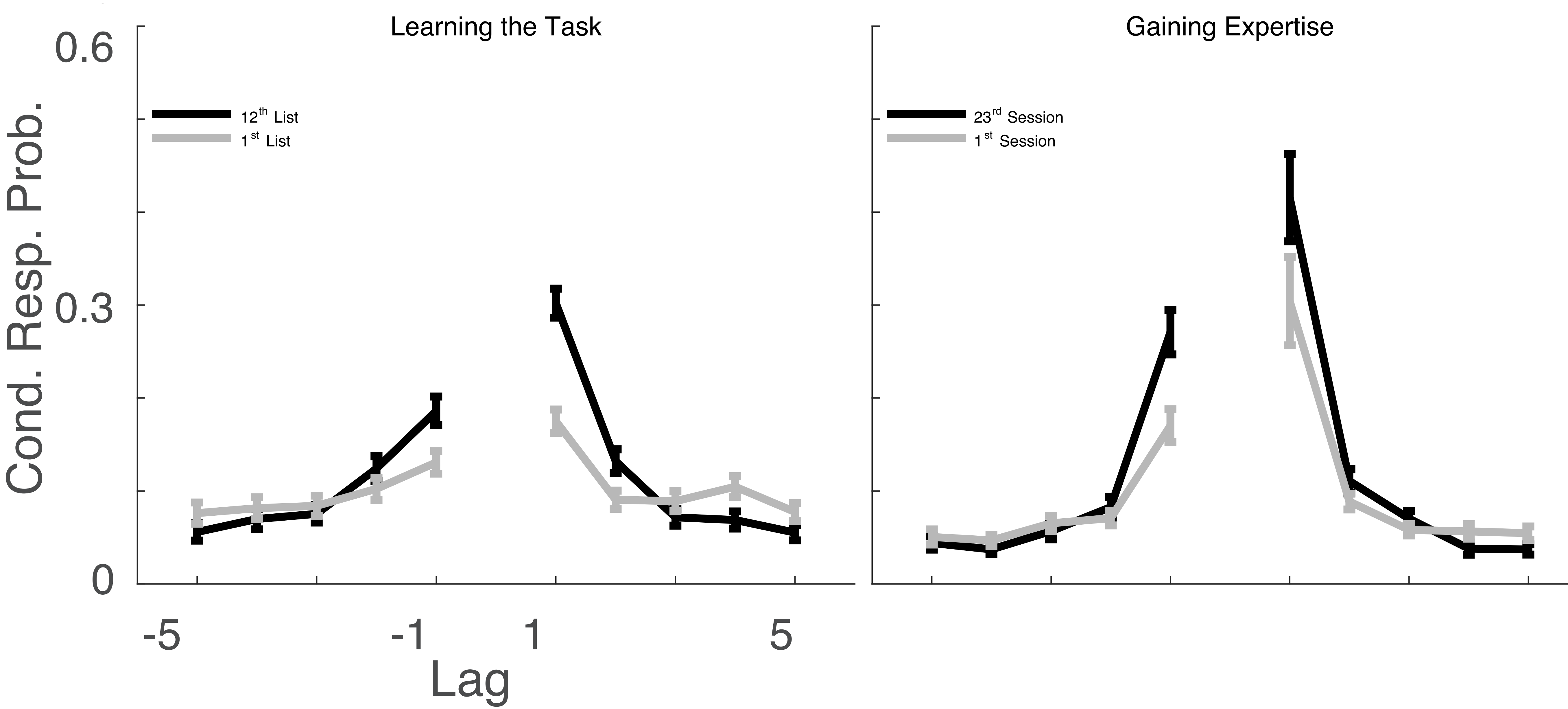

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Is it influenced by list length?

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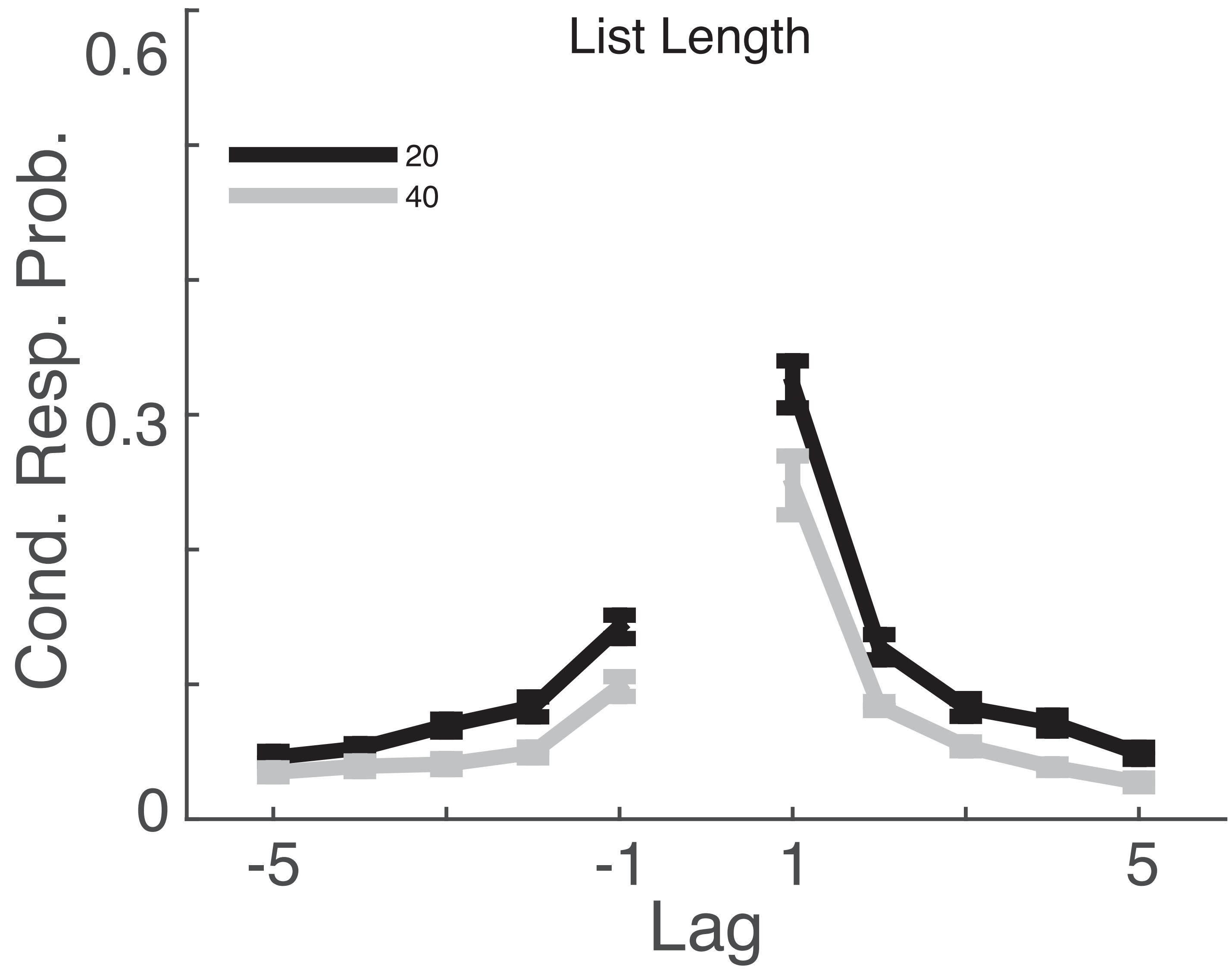

Healey & Kahana (submitted)

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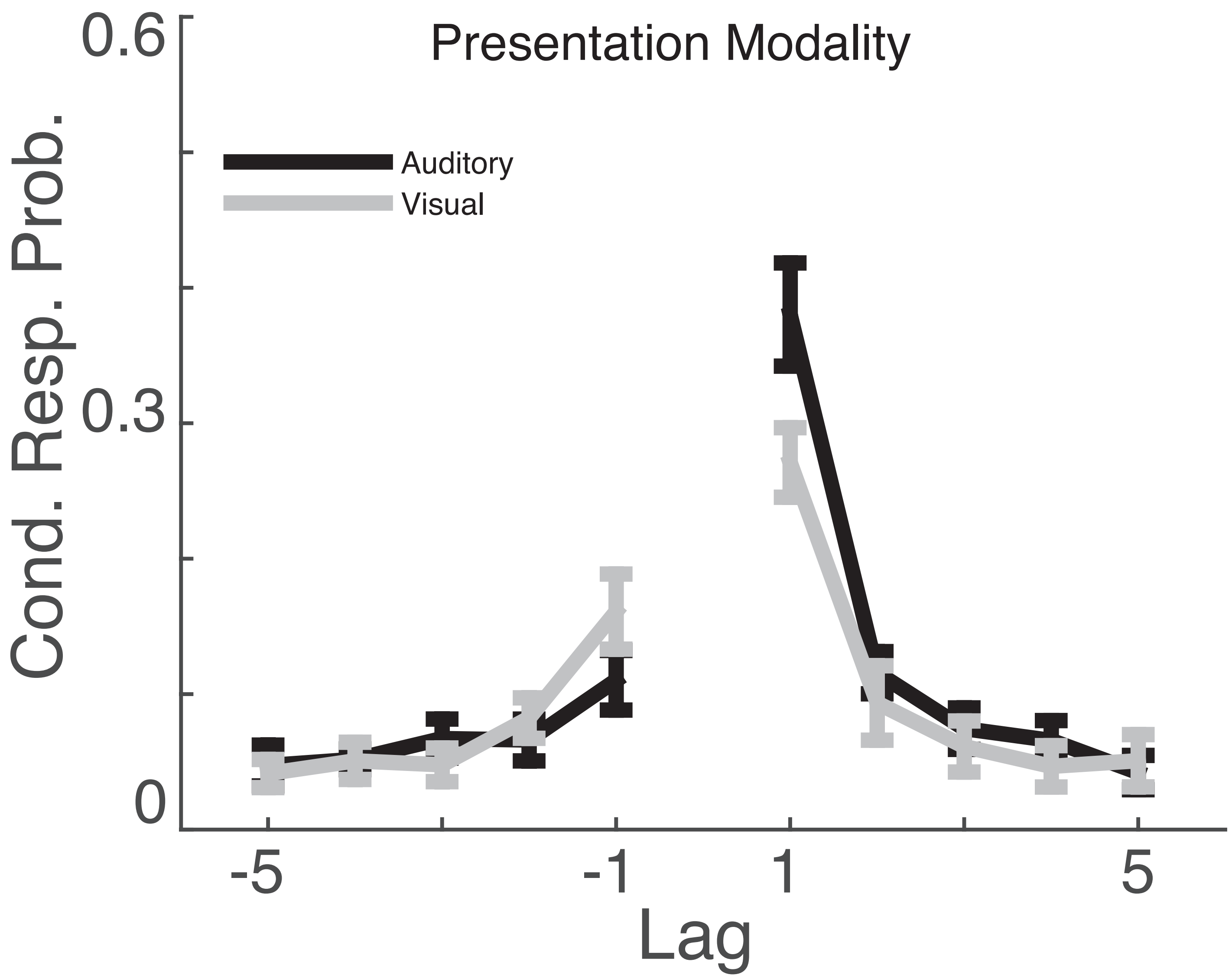

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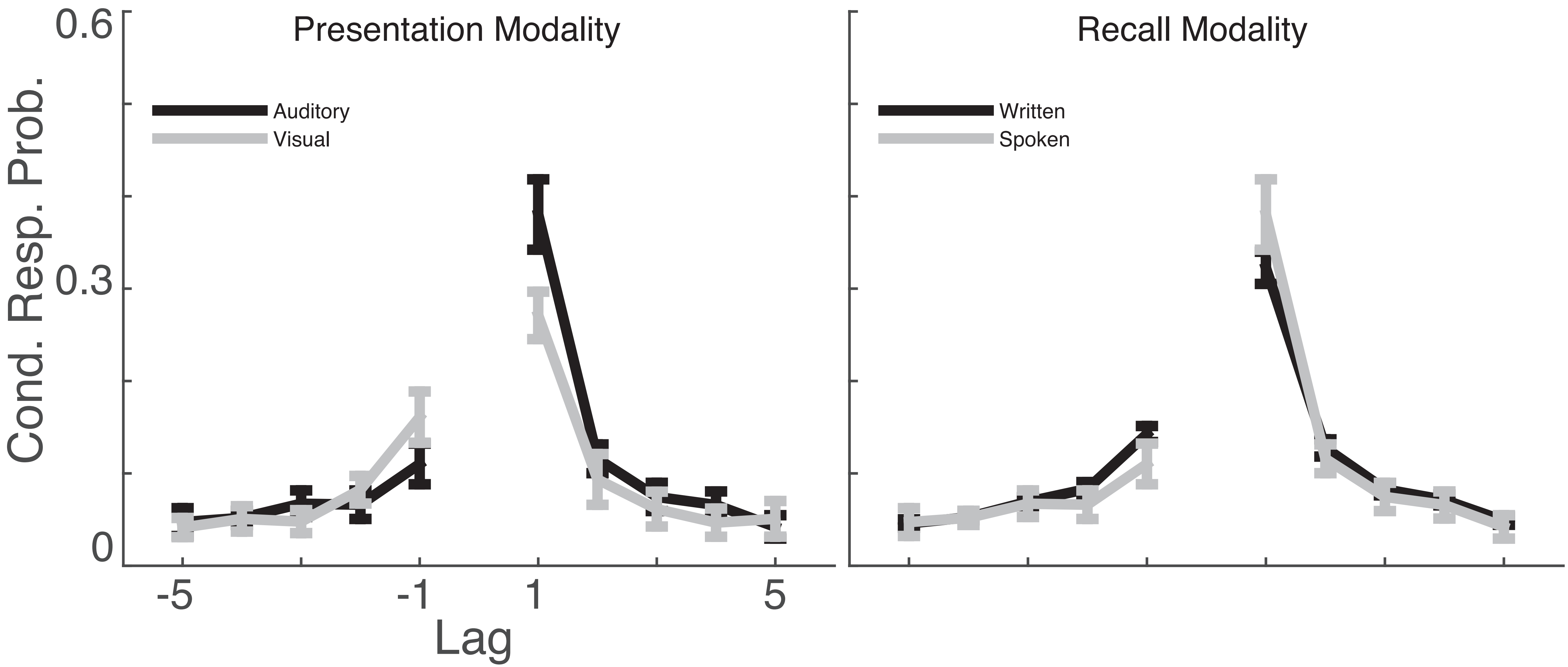

Healey & Kahana (submitted)

Presentation rate?

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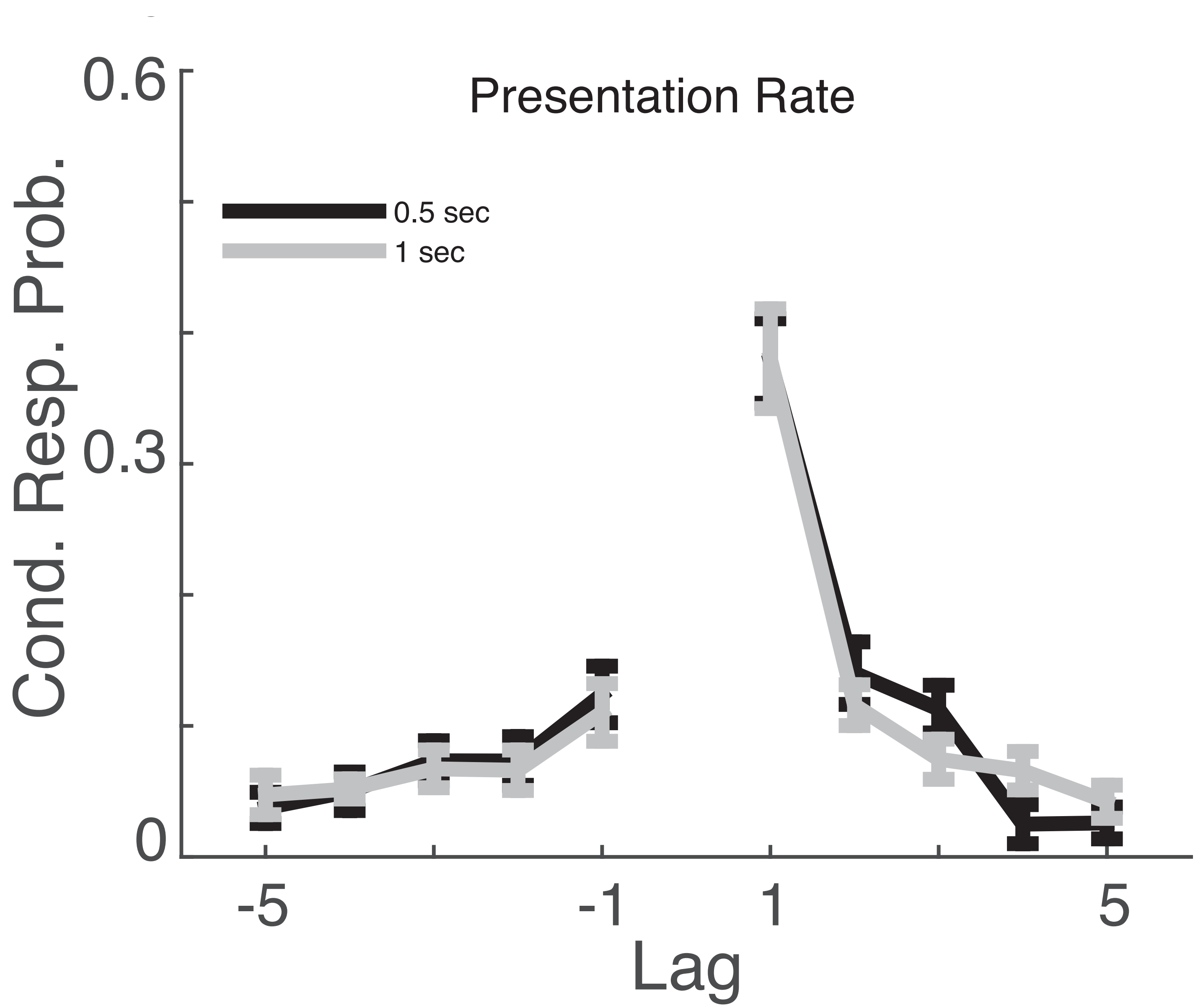

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Presentation rate?

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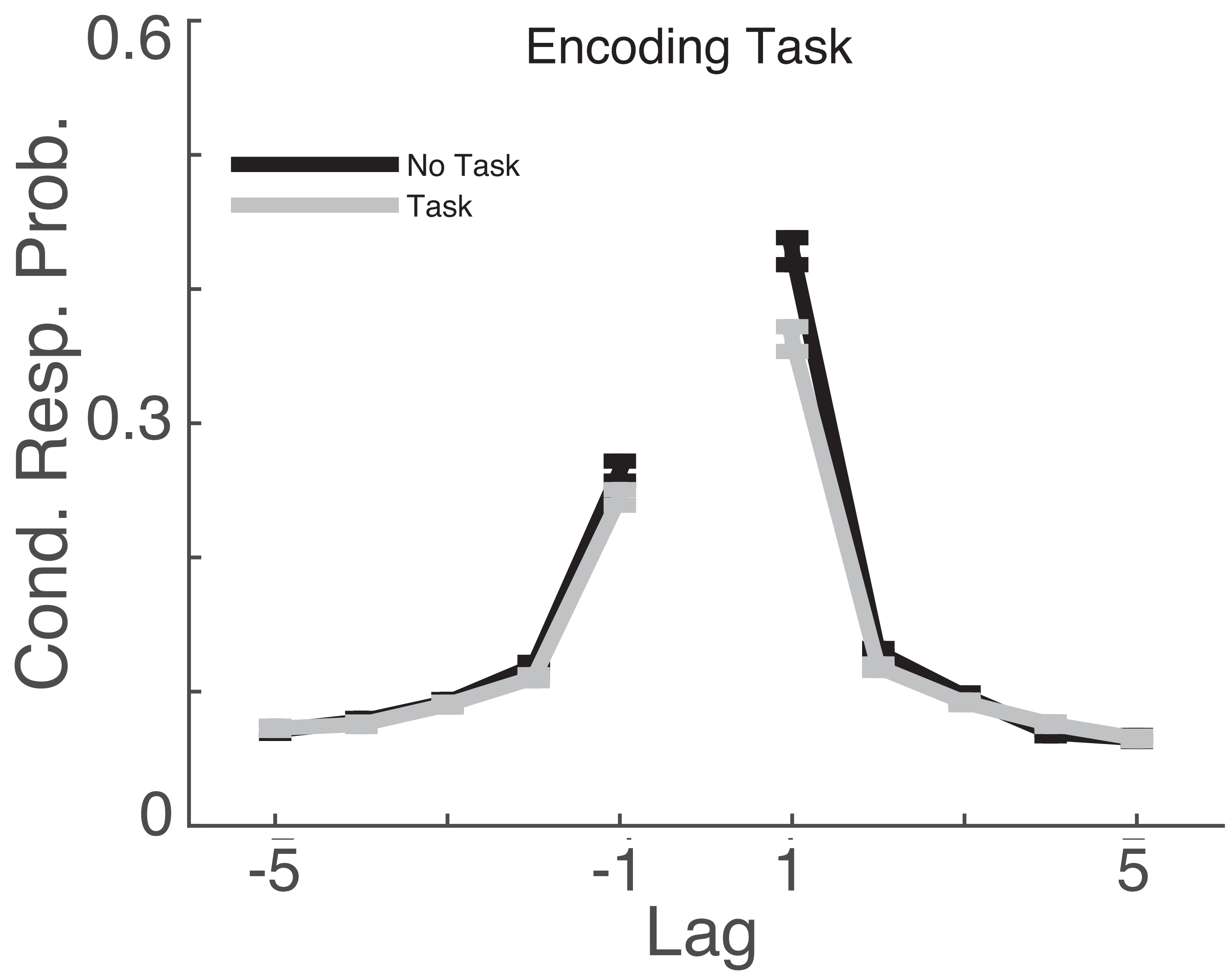

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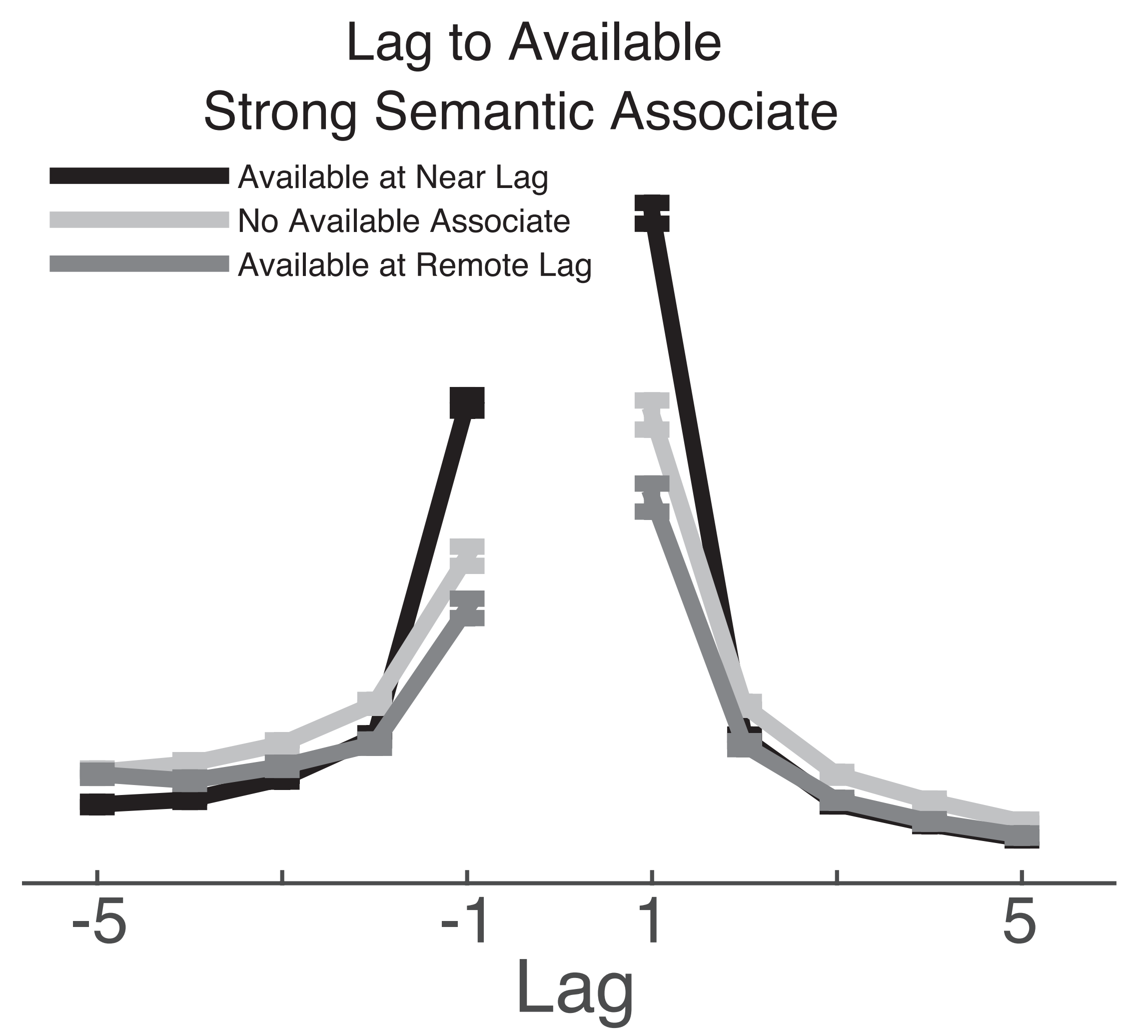

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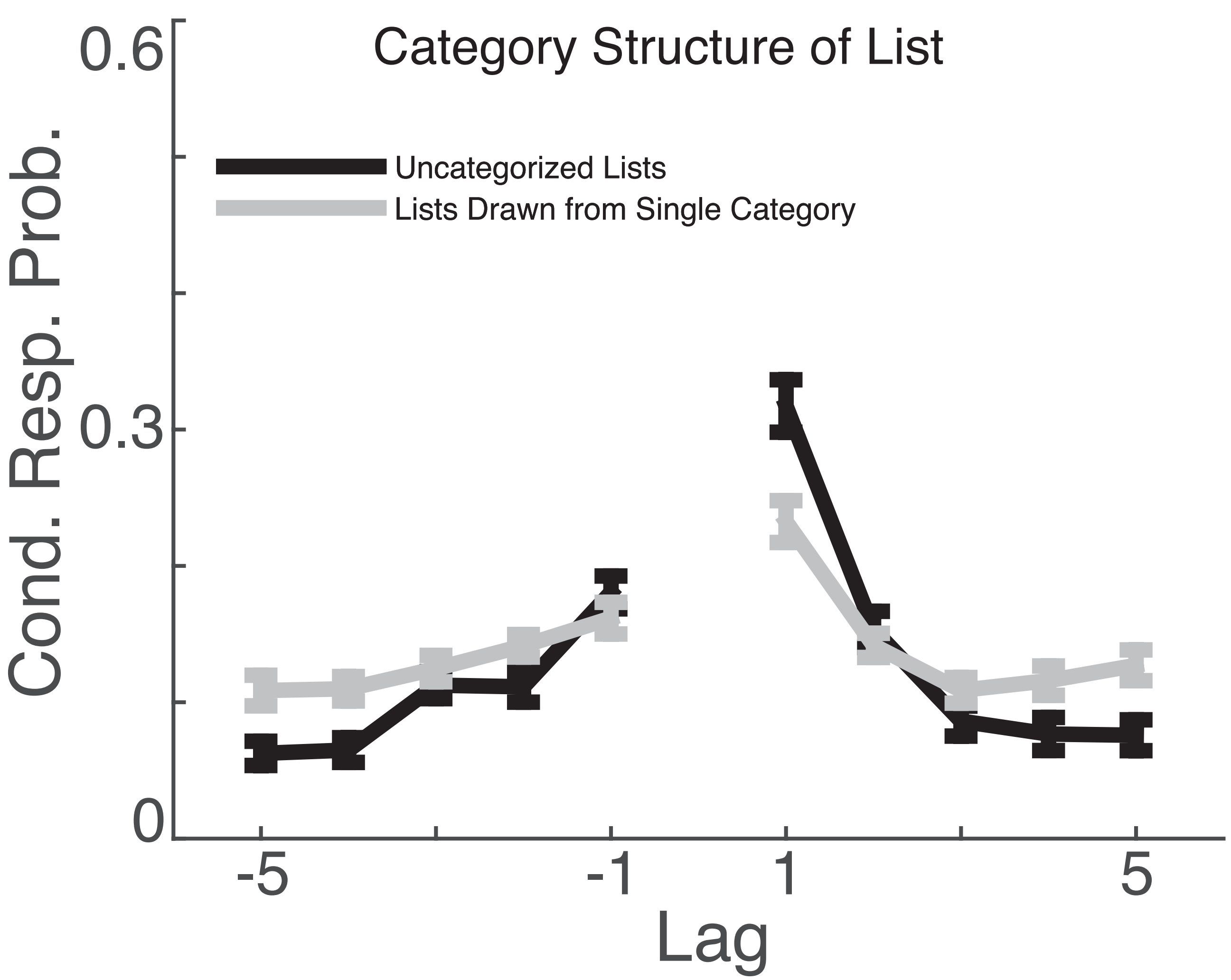
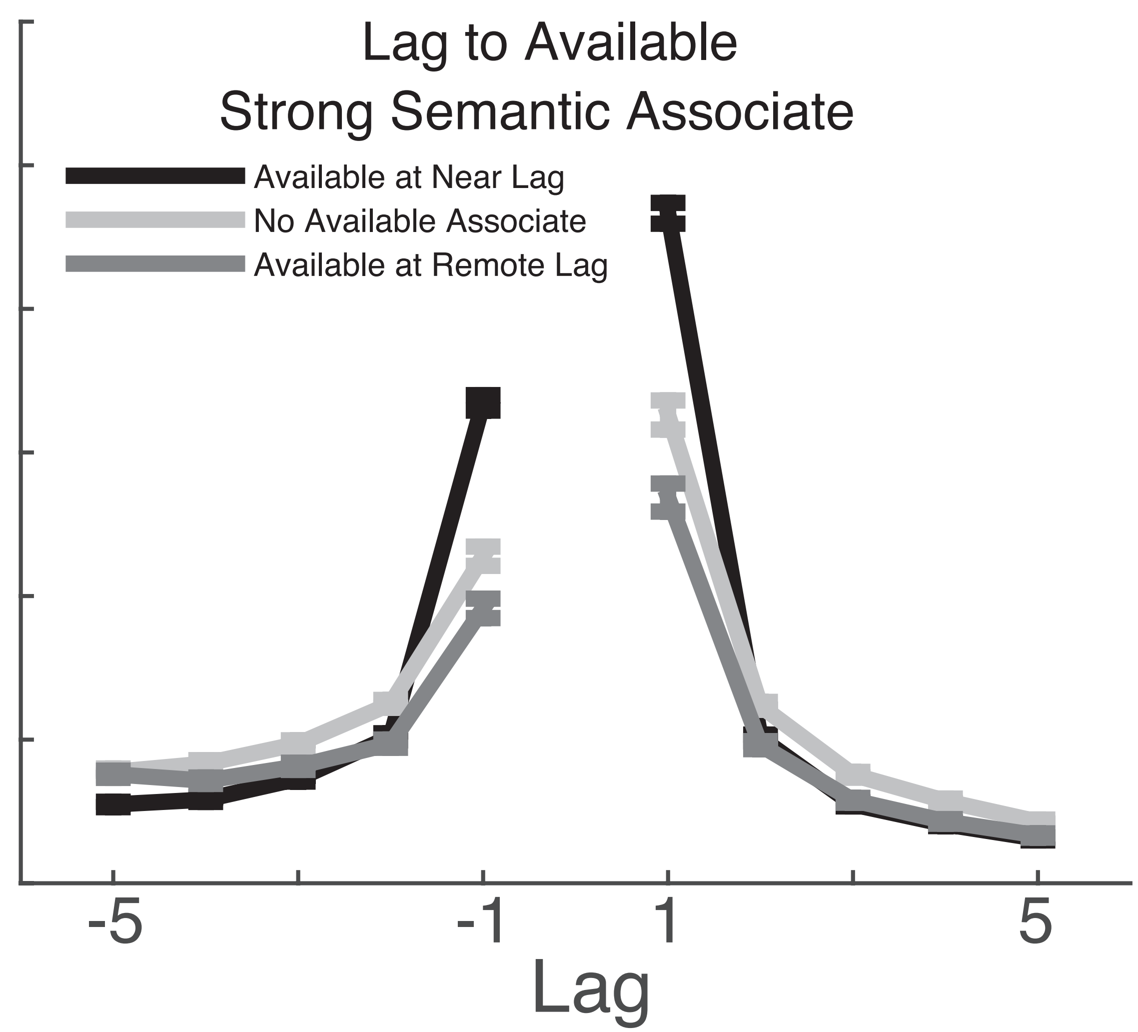


McCluey, Burke, & Polyn (submitted)



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By task demands?

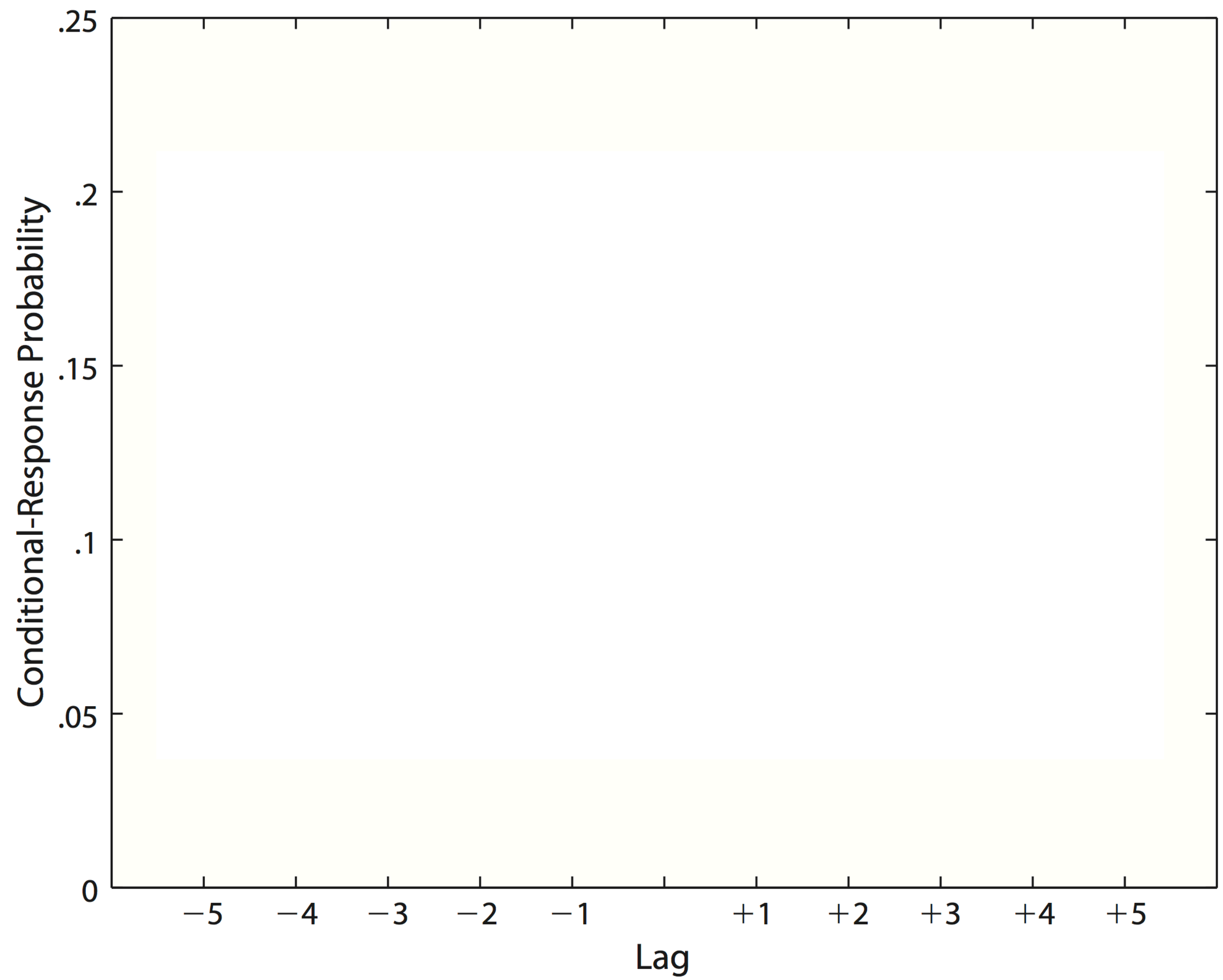

Figure 3. Effects of across-pair contiguity on paired-associate recall. The probability of an intrusion from pair $i + |\text{lag}|$ when the correct response is from pair i decreases monotonically with absolute lag.

Reproduced from: Davis, O. C., Geller, A. S., Rizzuto, D. S., and Kahana, M. J. (2008). Temporal associative processes revealed by intrusions in paired-associate recall. *Psychonomic Bulletin & Review*, **15**(1), 64-69.

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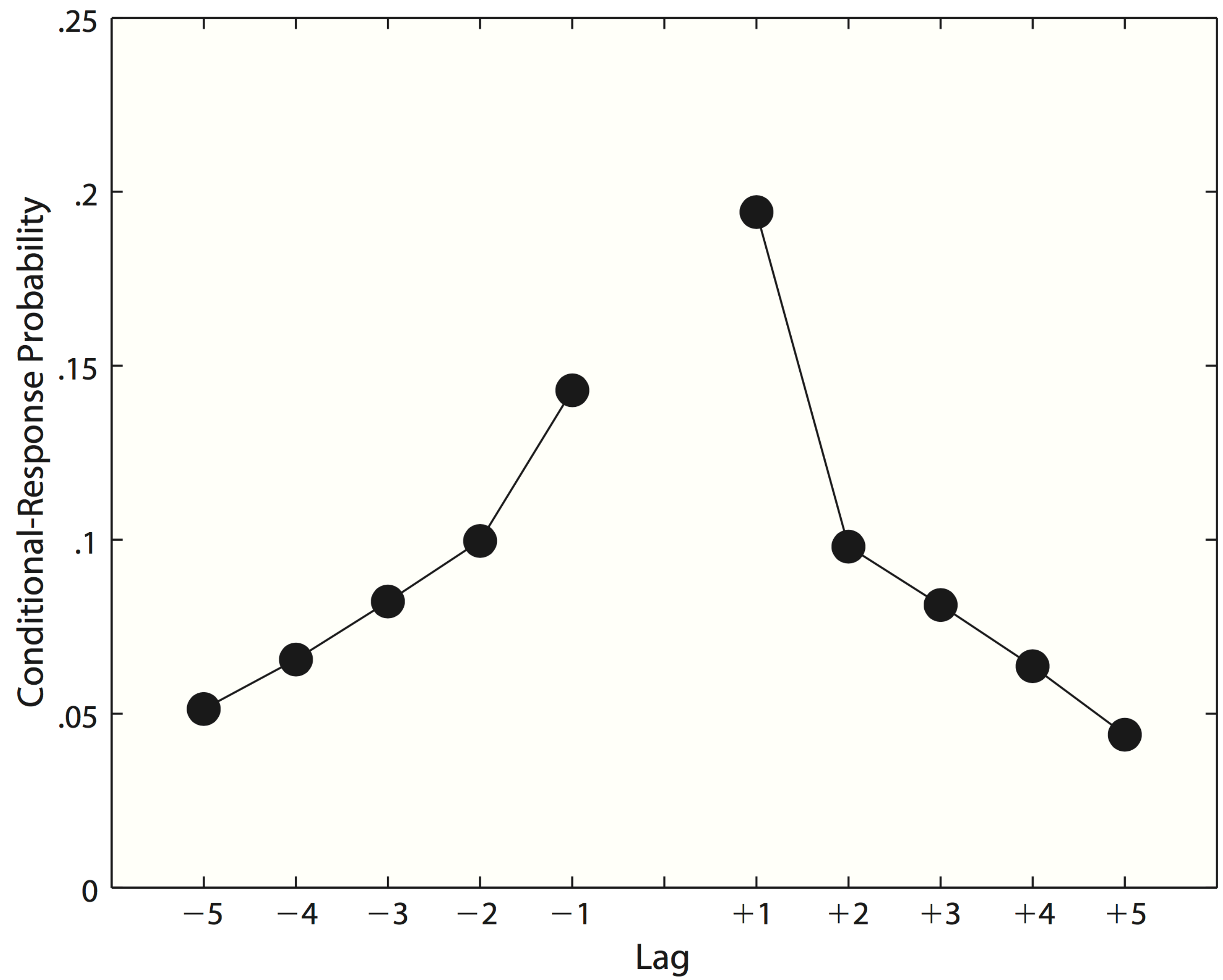

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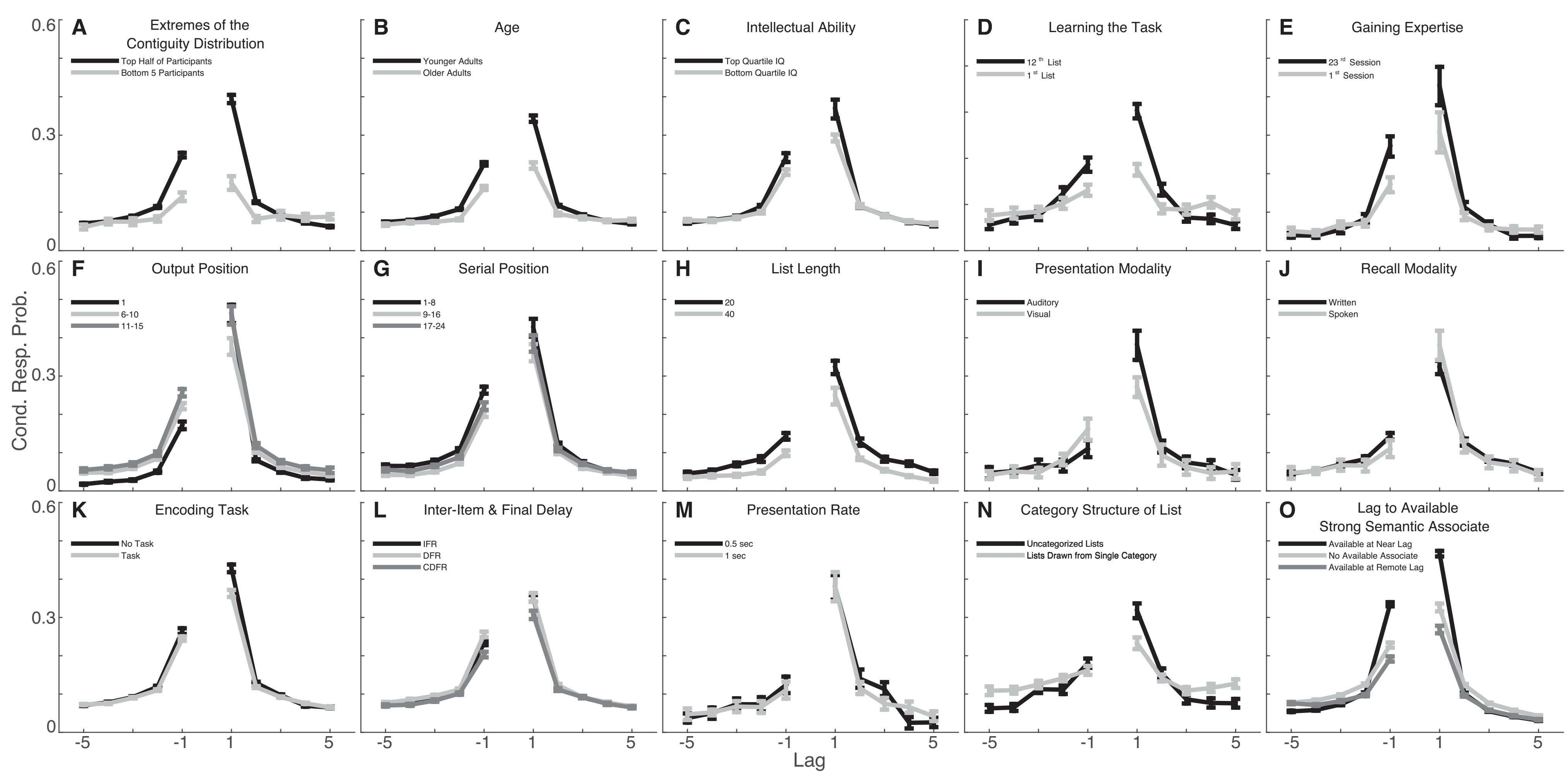

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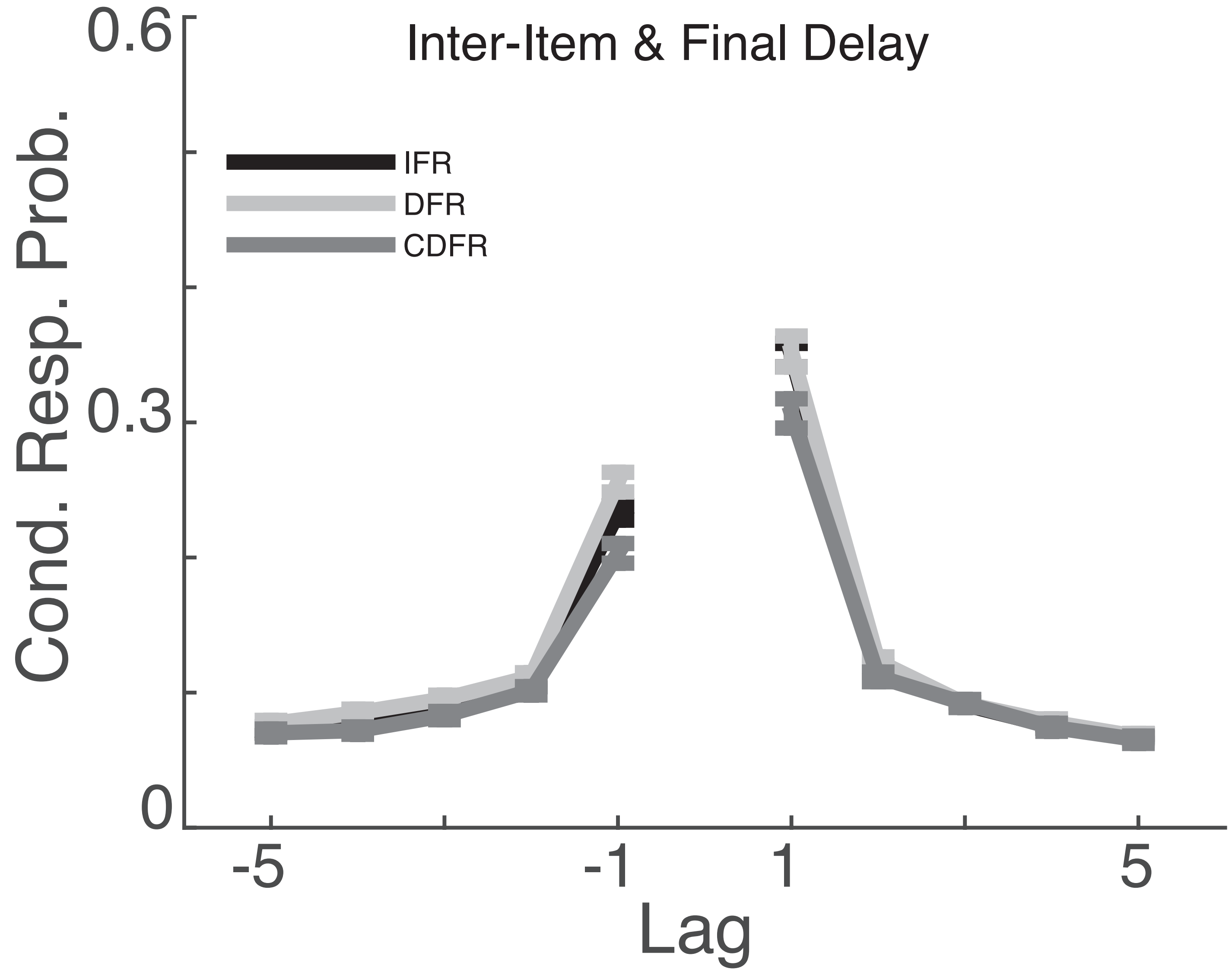
Long-Range Contiguity



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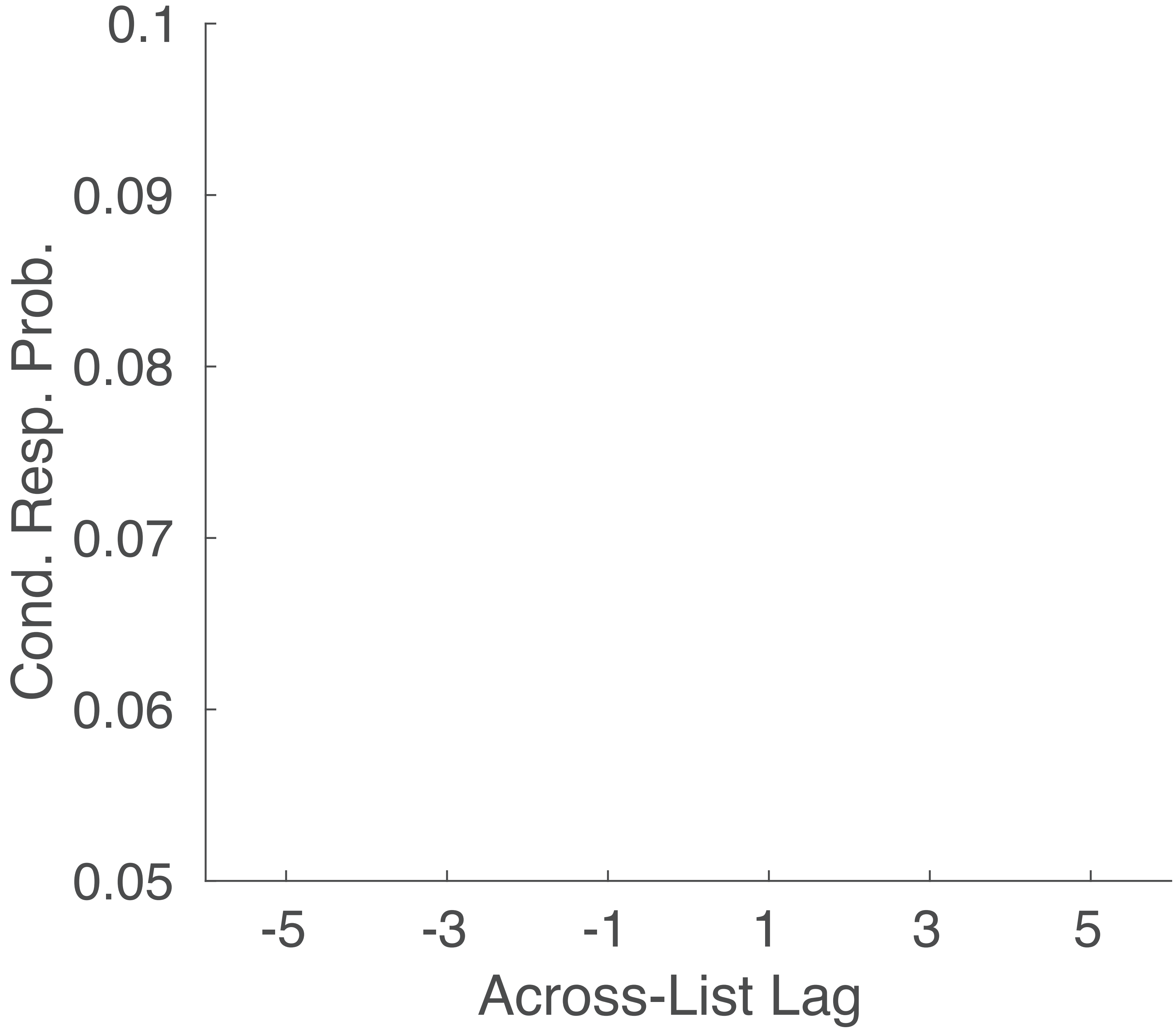

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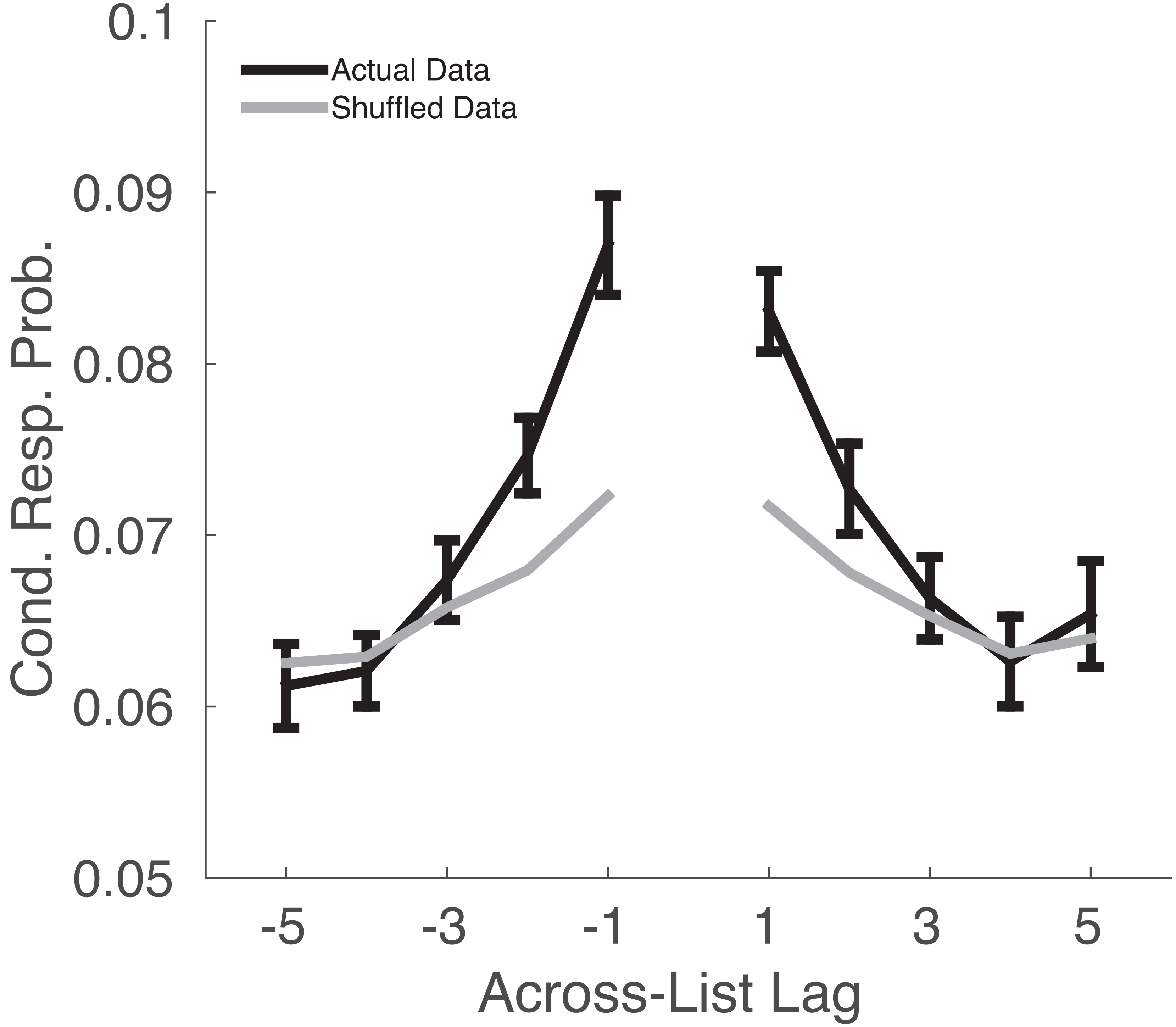

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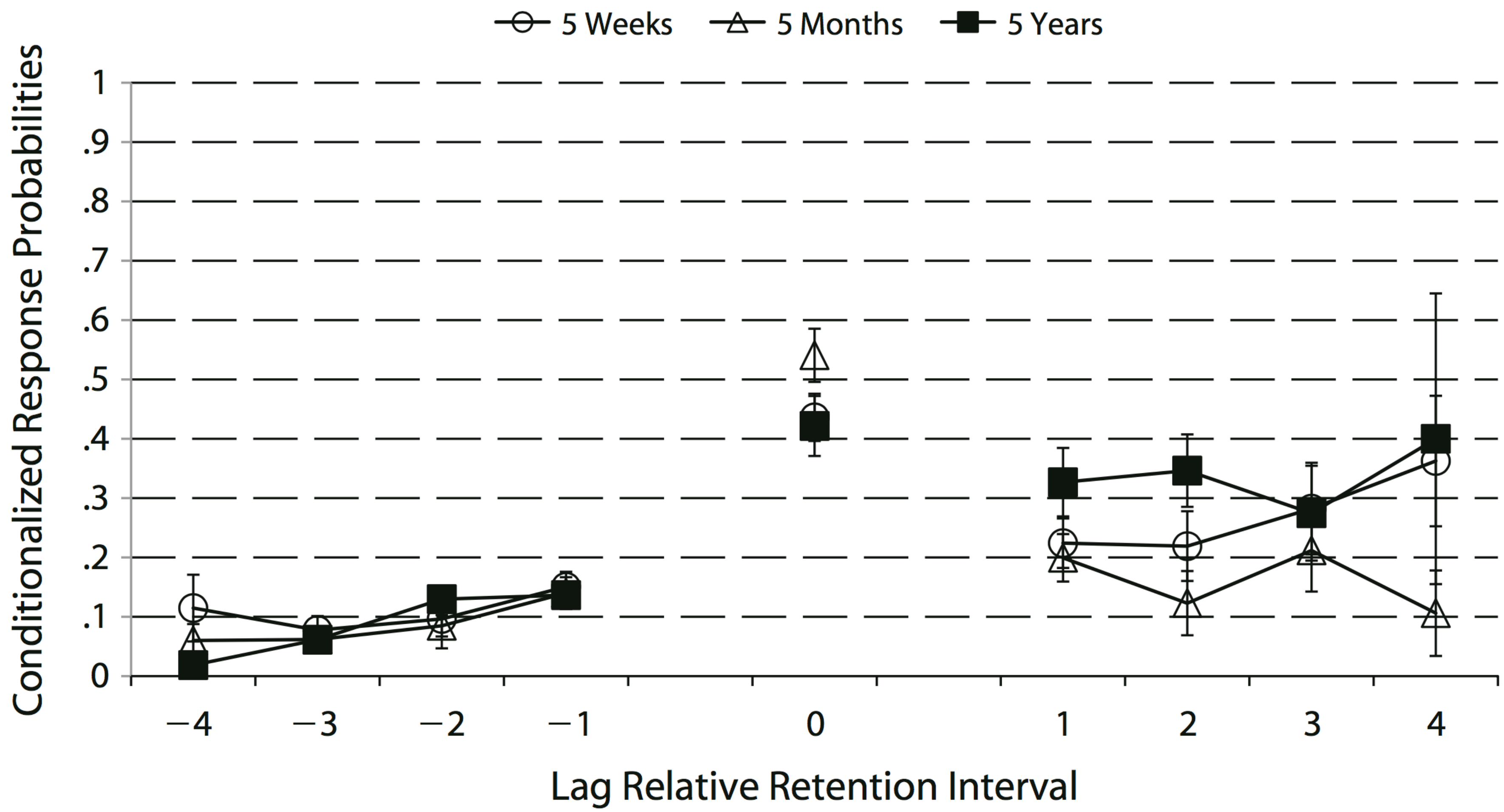

Figure 3. The lag conditionalized response probability (CRP) functions of recalled autobiographical events. *Lag* refers to the difference in relative retention intervals of successive responses, and the CRPs are calculated by dividing, for each participant, the different responses made at each lag by the number of opportunities that there were to make the different transitions. Error bars represent ±1 standard error.

Reproduced from: Moreton, B. J., & Ward, G. (2010). Time scale similarity and long-term memory for autobiographical events. *Psychonomic Bulletin & Review*, *17*(4), 510–515.

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But Why?

- Memory system encodes information about temporal distance (TCM, SIMPLE)
- It is a trick of the short time scale of free recall (STM buffer)
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Open questions

- Does temporal contiguity require intent to learn?
- In temporal contiguity important when material is richly semantically related?
- Does temporal contiguity really emerge over long time scales?

Thanks!

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