

Re-evaluating the contextual variability hypothesis of free recall

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Introduction

Contextual variability is the concept that increasing the lag between two presented items decreases the correlation between the contexts in which they occur. Thus, the number of different retrieval cues for recall increases.

Ross and Landauer (1978) found no advantage associated with contextual variability.

OR score is the probability that at least one of two items (one item and/or the other) is recalled.

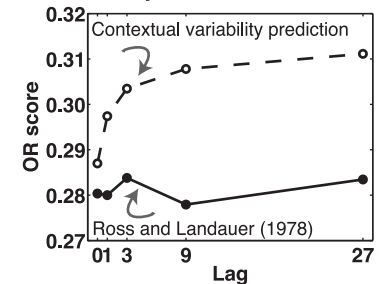
OR score calculations

Trial	Recalls			1 or 2	2 or 3	3 or 4	4 or 5	5 or 6
1	5	6	1	1	0	0	1	1
2	4	5	3	0	1	1	1	1
3	3	1	4	1	1	1	1	0
4	6	5	6	0	0	0	1	1
Total				2	2	2	4	3

OR score for lag = 1

$$\begin{aligned} &= <P(1 \text{ or } 2) + P(2 \text{ or } 3) + P(3 \text{ or } 4) + P(4 \text{ or } 5) + P(5 \text{ or } 6)> \\ &= (2/4 + 2/4 + 2/4 + 4/4 + 3/4) / 5 \\ &= 13/20 \end{aligned}$$

OR scores as function of lag: Theory and data

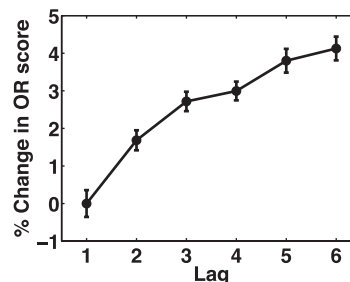


Re-evaluation of Ross and Landauer's (1978) null result

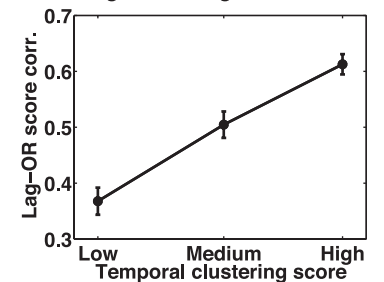
Experiment	Lag-OR score correlation
Murdock (1962), LL = 30	0.86
Murdock (1962), LL = 40	0.85
Howard and Kahana (2005)	0.95
Bridge (2006)	0.89
Polyn et al. (2009, unpublished)	0.83

All correlations are significant for $p < 0.05$.

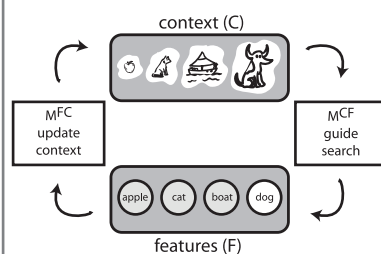
The OR score effect: OR scores do increase with lag



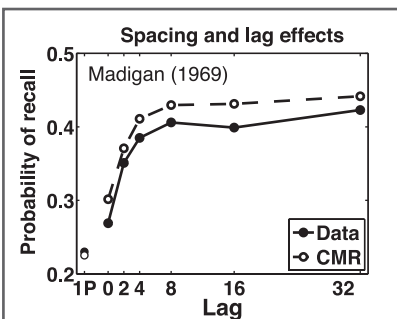
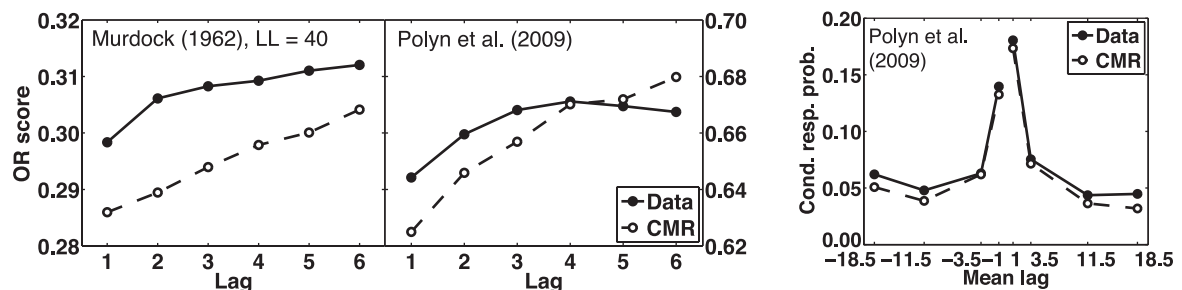
Participants who show greater temporal clustering exhibit larger OR score effects



Context maintenance and retrieval model (CMR)



The CMR model predicts both OR score and contiguity effects



Conclusions

- A reanalysis of the OR score effect provides strong support for contextual variability
- The CMR model of free recall accounts for the OR score effect, as well as temporal, semantic and source clustering
- CMR also predicts spacing and lag effects, but these reflect both contextual variability and study-phase retrieval

References

- Polyn, S. M., Norman, K. A., and Kahana, M. J. (2009). A context maintenance and retrieval model of organizational processes in free recall. *Psychological Review*, 116(1), 129-156.
- Ross, B., and Landauer, T. (1978). Memory for at least one of two items: Test and failure of several theories of spacing effects. *Journal of Verbal Learning and Verbal Behavior*, 17(6), 669-680.