

Neural correlates of temporal and semantic clustering in free recall

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Introduction

Organizational processes correlate with successful recall (Tulving, 1962; Thompson, 1972)

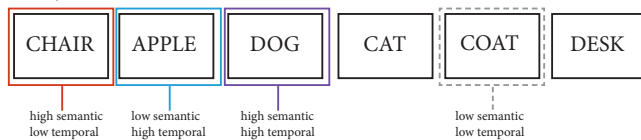
Temporal clustering: consecutive recall of nearby study items (Kahana, 2006)

Semantic clustering: consecutive recall of items related in meaning (Bousfield, 1953)

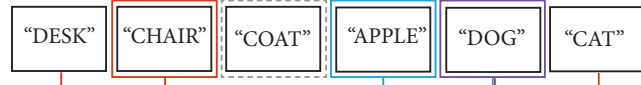
How do neural mechanisms of temporal and semantic clustering relate to those associated with recall success? What mechanisms are shared/different between temporal and semantic clustering?

Methods

study



recall



Free recall task where words vary in temporal and semantic relatedness

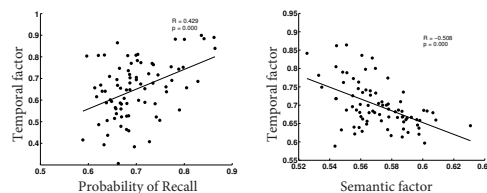
Temporal relatedness determined by lag (difference in serial position)

High temporal: lag = 1, Low temporal: lag > 2

Semantic relatedness determined by word association score (Nelson et al., 2004)

High semantic: WAS > .6, Low semantic: WAS < .2

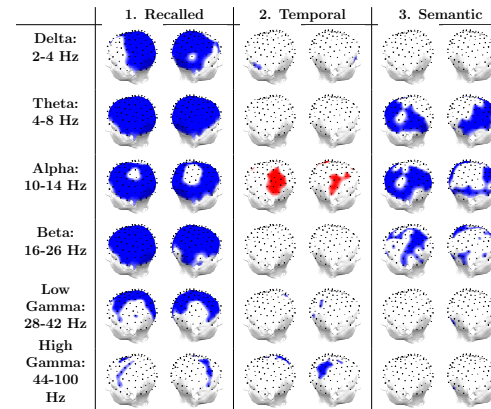
Behavioral results



EEG methods

80 participants
7 sessions
16 lists per session
16 words per list
Scalp EEG 129 electrodes
Analyzed words at encoding as a function of neighbors at recall

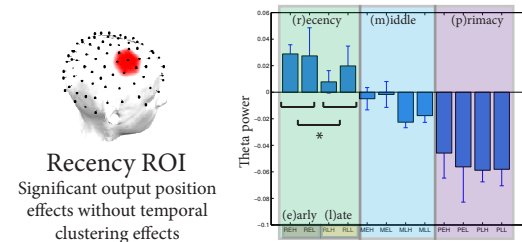
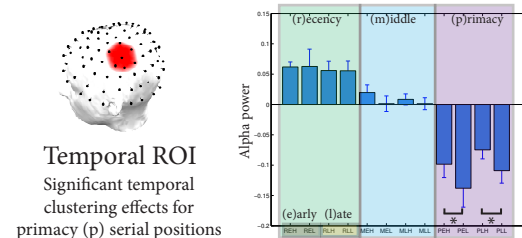
EEG results



- (1) Power decreases across frequencies for recall
- (2) Alpha power increases for temporal clustering
- (3) Theta, alpha, beta power decreases for semantic clustering

Temporal clustering and recency

A 3x2x2 analysis of serial position (recency, middle, primacy) by output position (early, late), by temporal clustering (high, low)



Summary

- Successful recall and semantic clustering are both supported by low frequency power increase
- Semantic and temporal clustering are supported by different neural mechanisms and are negatively correlated behaviorally
- Temporal clustering is distinct from recency though both might involve a slowly updating context

Future Directions

- Temporal and semantic clustering effects in delayed free recall
- Interactions between temporal and semantic clustering
- Temporal and semantic clustering effects during retrieval period

References

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- Nelson, DL & McEvoy, CL (2004) The University of South Florida free association, rhyme and word fragment norms. *Beh. Res. Methods* 36 (3): 402-407
- Tulving, E (1962) Subjective organization in free recall of "unrelated" words. *Psych. Review* 69 (4): 344-354
- Thompson, CP (1972) Organization in memory: Multitrial free recall of categorized word lists. In RF Thompson & JF Voss (Eds.), *Topics in learning and performance* (pp. 241-263). San Diego, CA: Academic Press

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