

A language-based account for semantic encoding in verbal short-term memory



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Introduction

- Verbal short-term memory (STM) tasks typically rely on phonological codes, and long-term memory (LTM) tasks on semantic codes¹
 - Semantic information may take longer to access
 - Semantic information may not be available at initial encoding
 - Discrepancy in early access to phonological over semantic information may be most marked for low STM loads fitting easily within focus of attention
- LTM also affects verbal STM tasks: psycholinguistic variables², neuropsychological patients³, neuroimaging studies⁴
- Questions remain about whether verbal STM also depends on semantic encoding and retention
 - *Language-based account*: temporary activation of (semantic) LTM along with phonological representation at exposure
 - *Redintegration account*: Semantic information accessed at retrieval via phonological reconstruction of stimuli

Research Questions:

- Is semantic information as easily accessed as phonological information in STM recognition tasks?
- Is there a phonological information advantage for low STM loads?

Methods

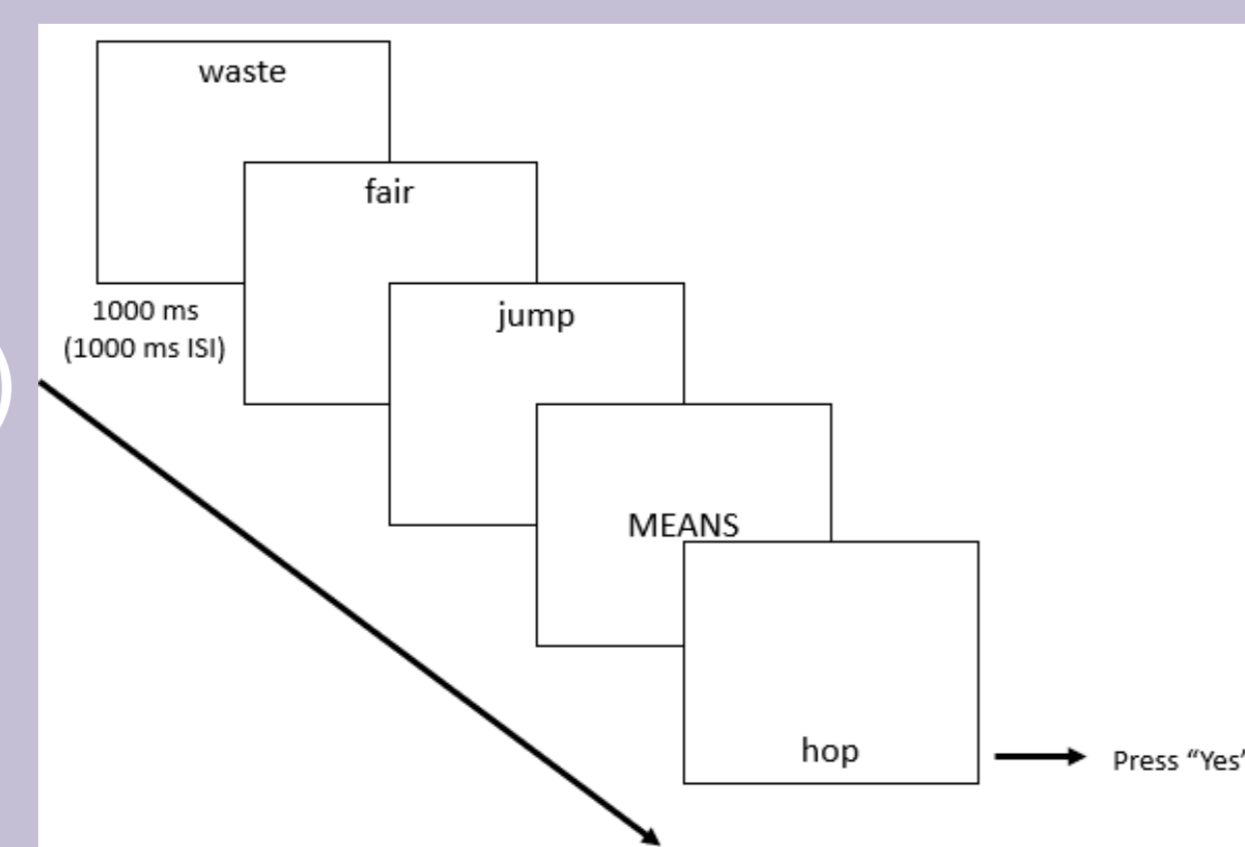
Participants: 31 healthy, young adults

Procedure:

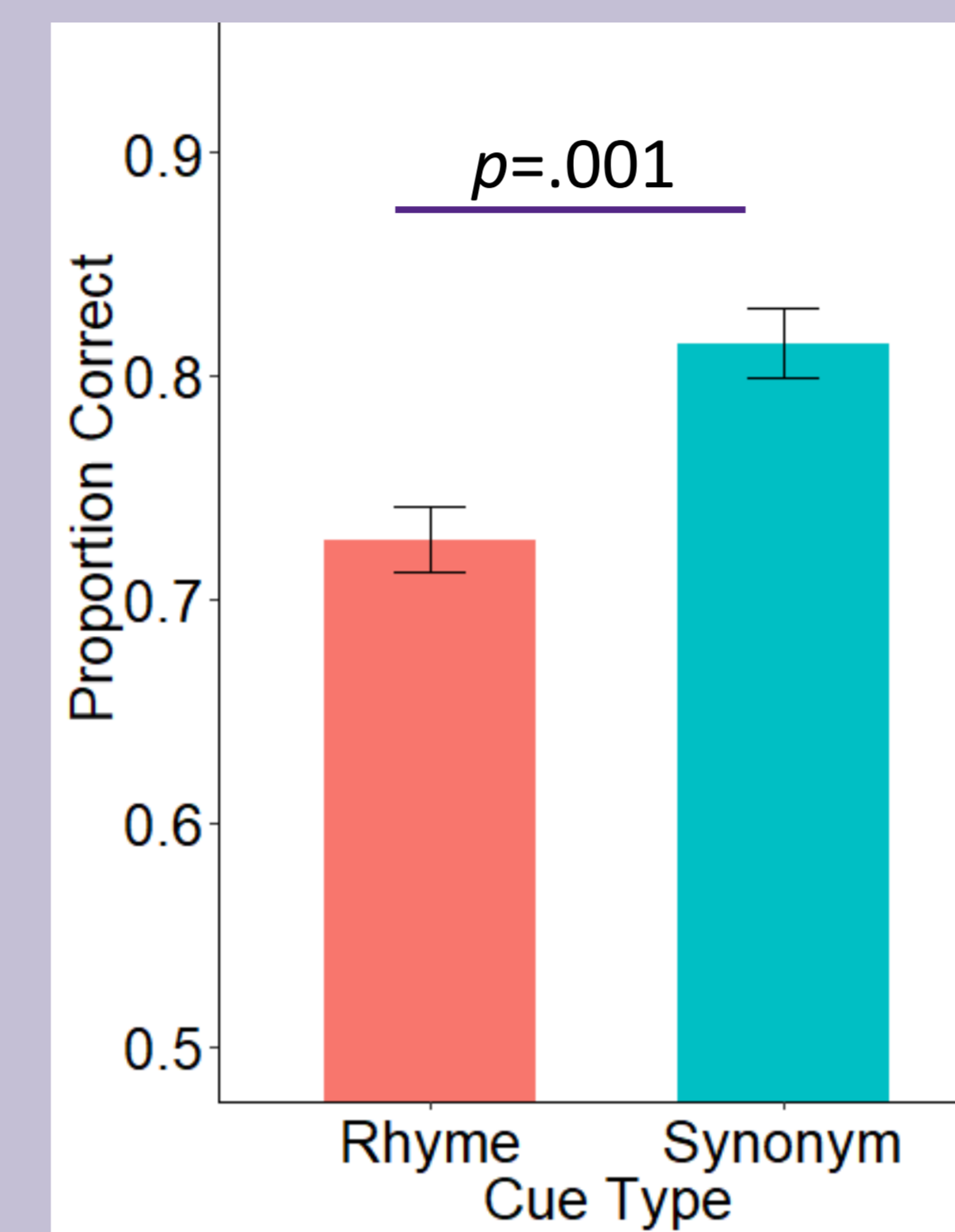
1. 10 lists of 3, 5, 7, 9, 11 words presented individually
2. After the list, a cue word was given to signal the type of recognition: 'RHYME' or 'MEANS'
3. Probe word displayed, participant judged relation to any list word based on type of recognition cued

Materials: Sample items

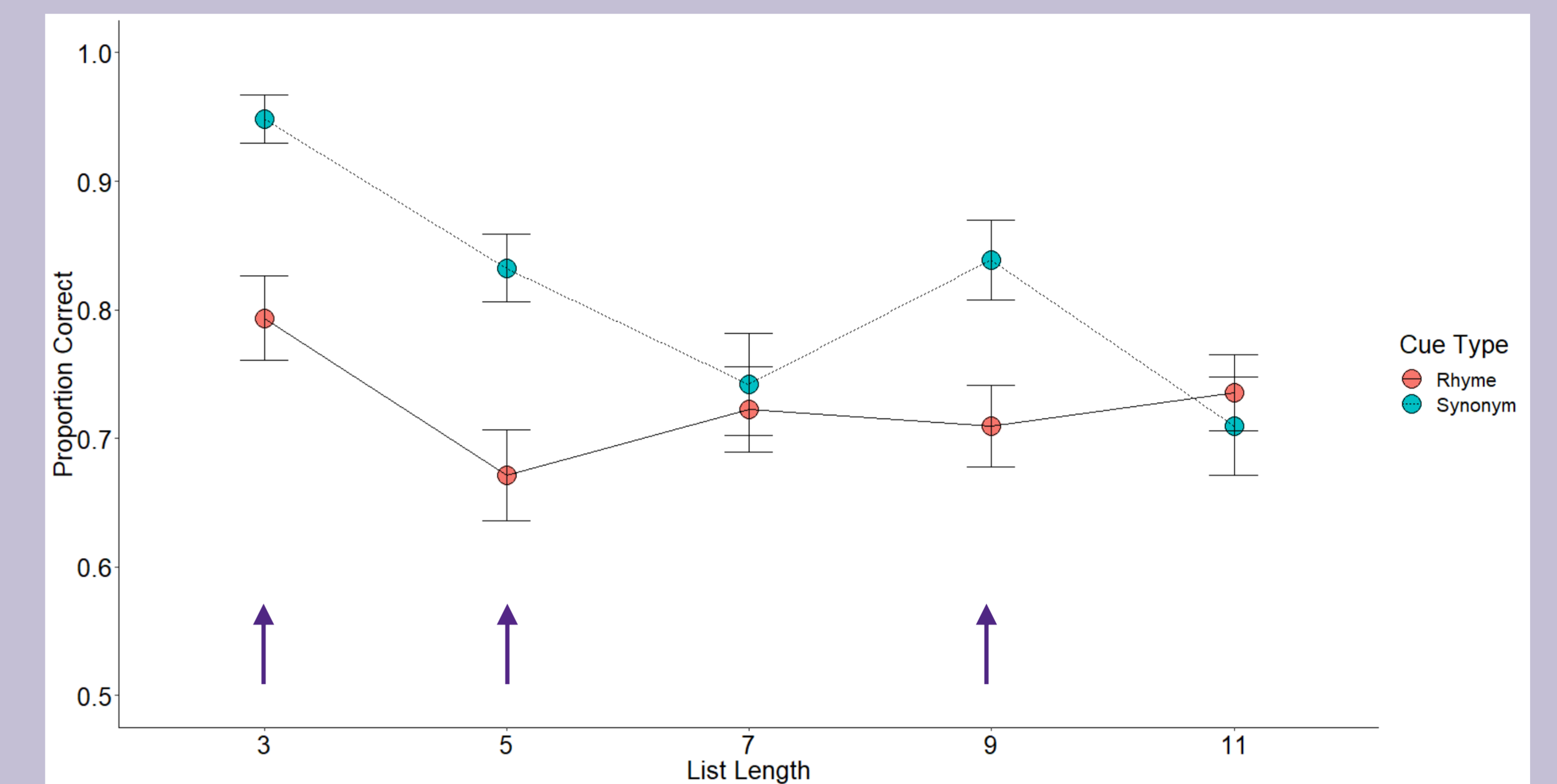
- RHYME: (orthographically similar/dissimilar)
 - probe word 'card' - list word 'hard'
 - probe word 'throat' - list word 'note'
- MEANS (synonym)
 - probe word 'sound' - list word 'noise'



Results



Scores on synonym > rhyme task, $F(1,30) = 13.05$



Scores on shorter > longer lists, $F(4,30) = 7.67$, $p < .001$

Interaction between cue type & list length, $F(4,30) = 3.75$, $p = .007$, with a semantic advantage for lists of 3, 5, 9 words

Conclusion

- Both phonological and semantic information are represented independently in verbal STM
- Immediate encoding or reporting from focus of attention suggested by:
 - Better recognition of semantically processed words
 - Semantic advantage present even at short list lengths
- Consistent with language-based models for direct activation of LTM rather than redintegration account

References

1. Baddeley, A. D. (1966). Short-term memory for word sequences as a function of acoustic, semantic and formal similarity. *The Quarterly Journal of Experimental Psychology*, 18, 362–365.
2. Campoy, G., Castellà, J., Provencio, V., Hitch, G. J., & Baddeley, A. D. (2015). Automatic semantic encoding in verbal short-term memory: Evidence from the concreteness effect. *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, 68, 759–778.
3. Martin, N., & Saffran, E. M. (1992). A computational account of deep dysphasia: Evidence from a single case study. *Brain and Language*, 43, 240–274.
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Future Directions

- Investigate whether the effect of a dual task (e.g., articulatory suppression) will impair phonological information over and above semantic information
- Contrast task demands of a item recognition vs. serial oral recognition