

Phrases don't behave like words: Phrase frequency effects in recognition memory

Cassandra L. Jacobs¹, Gary S. Dell¹, Aaron S. Benjamin¹, Colin Bannard²

¹: University of Illinois at Urbana-Champaign; ²: University of Texas at Austin

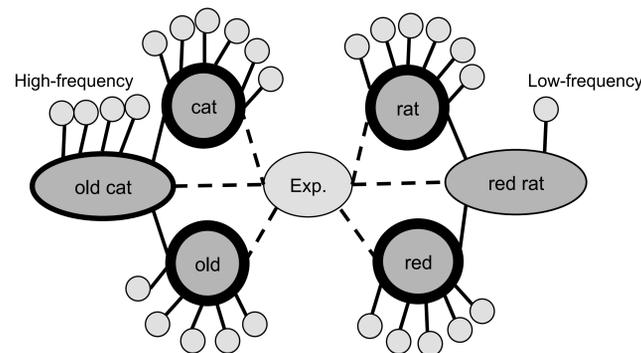
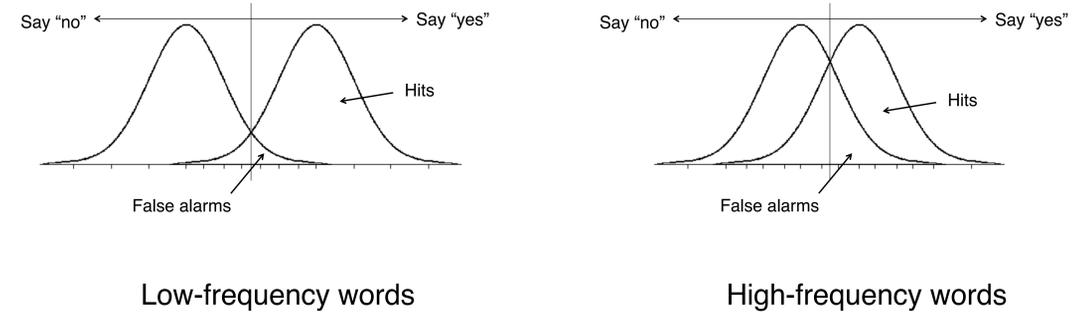
This research was supported in part by NIH grant DC000191. The first author is also a recipient of an NSF Graduate Research Fellowship.

The wordlikeness of multi-word phrases

Task	Frequency advantages			
	Words		Phrases	
	Low	High	Low	High
	<i>anvil</i>	<i>tree</i>	<i>flaming bounds</i>	<i>undue hardship</i>
Production	High > Low ^{1,2}		High > Low ^{1,2}	
Comprehension	High > Low ³		High > Low ³	
Acquisition	High > Low ⁴		High > Low ⁴	

A word frequency paradox in recognition memory

Low-frequency words do better (more hits and fewer false alarms) [5].



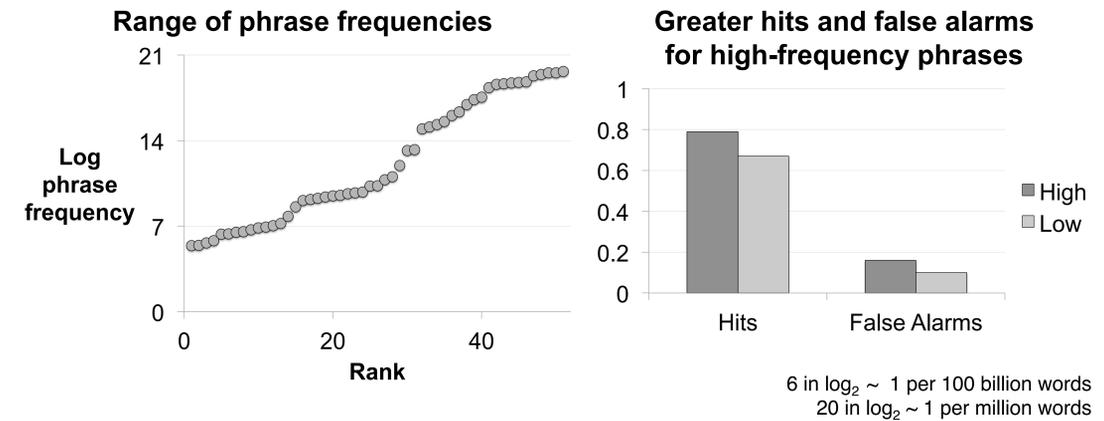
A proposed model for multi-word phrases

Single words: Recognition requires retrieval of an experimental episode (**Exp.**). With high-frequency words, there are more *other* episodes to interfere with access of **Exp.** for old words and to promote false alarms for new words.

Phrases are composed of words and are also represented in episodic memory. The words and the phrases contribute to recognition judgments.

The role of phrase frequency – Experiment 3

Adjective-noun pairs with varying phrase frequency (e.g. *alcoholic beverage*, *psychic nephew*, *undue hardship*).

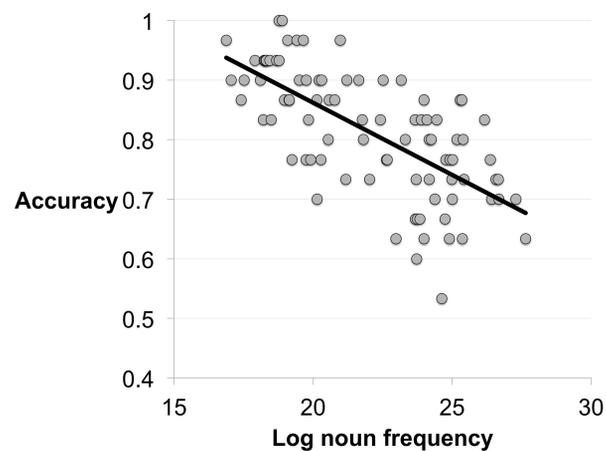


The role of word frequency – Experiments 1 and 2

Participants study nouns ([6]) or phrases containing those nouns. We should see the low-frequency advantage.

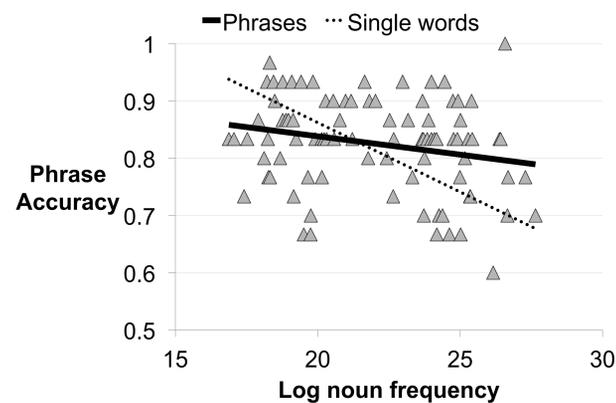
Experiment 1 – wizard, tree

Higher accuracy for low-frequency nouns



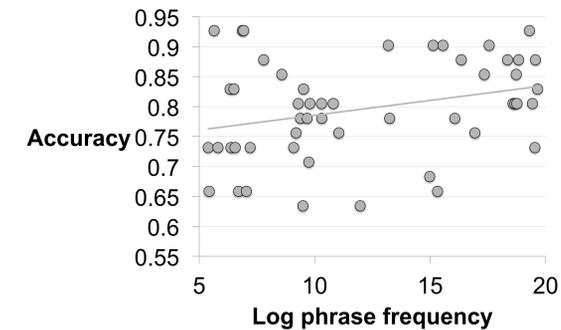
Experiment 2 – handsome wizard, premature tree

Smaller but clear advantage for phrases containing low-frequency nouns

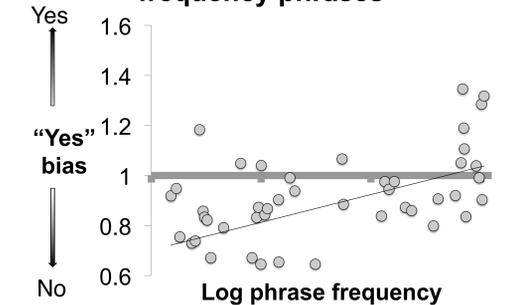


15 in $\log_2 \sim 3$ per 100 million words
30 in $\log_2 \sim 1000$ per million words

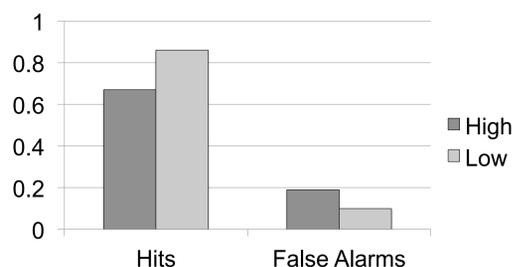
No low-frequency advantage



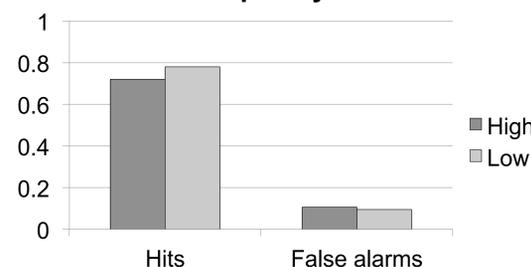
Strong bias against low-frequency phrases



More hits and fewer false alarms for low-frequency words



More hits and fewer false alarms for phrases containing low-frequency words



Discussion

Memories store meaning, and a phrase's meaning is mostly the sum of the words within it. Each phrase accesses memories associated with each word and the whole phrase but there are many more memories for the individual words, overwhelming any phrase frequency differences. That is why the frequency of the *noun within a phrase* matters just like it does for single words.

The bias to say "yes" to high-frequency phrases demonstrates an influence of familiarity on recognition judgments. That the relevant familiarity is *phrasal* is evidence that multi-word sequences are stored and accumulate frequency.

References

- [1] Janssen, N., & Barber, H. A. (2012). Phrase frequency effects in language production. *PLoS ONE*, 7, e33202. [2] Janssen, N., Bi, Y., & Caramazza, A. (2008). A tale of two frequencies: Determining the speed of lexical access for Mandarin Chinese and English compounds. *Language and Cognitive Processes*, 23, 1191–1223. [3] Arnon, I., Snider, N., (2010) More than words: Frequency effects for multi-word phrases. *Journal of Memory and Language*, 62, 67–82. [4] Bannard, C. & Matthews, D. (2008). Stored word sequences in language learning : The effect of familiarity on children's repetition of four-word combinations. *Psychological Science*, 19, 241-248. [5] Glanzer, M., & Adams, J. K. (1985). The mirror effect in recognition memory. *Memory & Cognition*, 13, 8–20. [6] Balota, D. A., Burgess, G. C., Cortese, M. J., & Adams, D. R. (2002). The word-frequency mirror effect in young, old, and early-stage Alzheimer's disease: Evidence for two processes in episodic recognition performance. *Journal of Memory and Language*, 46, 199–226.