

Phrase frequency stitches words together in free recall

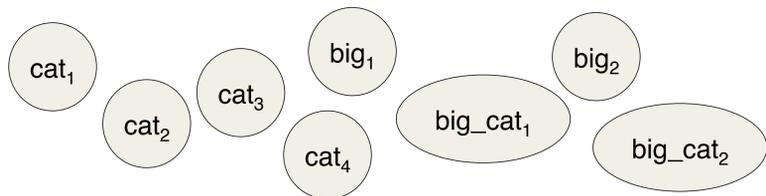
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Holistic compositional phrase representations for language processing

- More common phrases in a language are easier on every dimension, just like words
 - comprehension (Arnon & Snider, 2010; Smith & Levy, 2013)
 - production (Janssen & Barber, 2012)
 - acquisition (Bannard & Matthews, 2008)
- **Exemplar theories** of word and phrase frequency might explain frequency effects (Bybee, 2006; Pierrehumbert, 2001)

Do compositional phrases have word-like episodic representations?

- Recognition memory requires finding a context given a stimulus
 - Participants say they remember high frequency phrases, but *accurate* memory depends on word frequency (Jacobs et al., 2016)
 - Phrases may not have holistic episodic representations
 - If they don't, where does phrase frequency matter?



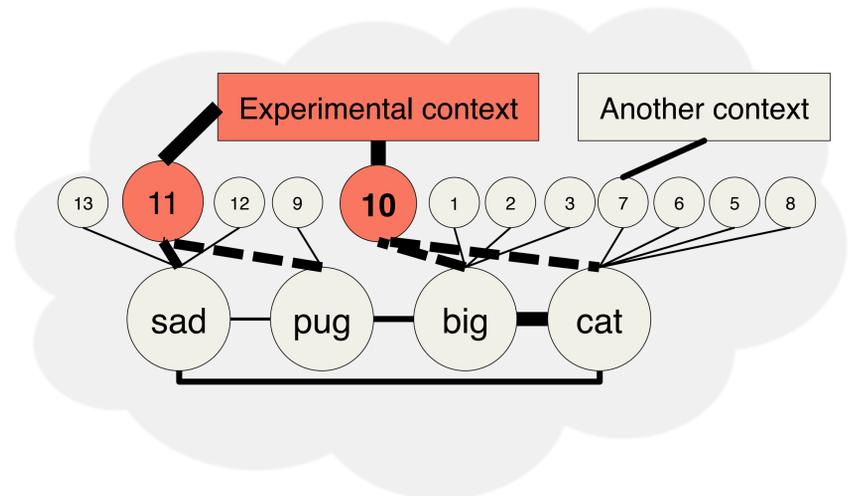
Does phrase frequency impact free recall?

- Recall maps from a given context to an item during retrieval – opposite of recognition process
- Phrase frequency might affect success of both partial (**p = probability of recall of at least one word**) and complete recall (**q = probability of recall both words given recall of either**)
- If **p (partial recall)** is greater for HF phrases → stronger episodic links from context to words in the phrase
 - If **q (complete recall)** is greater for HF phrases → long term memory helps with pattern completion (**redintegration**)
 - If q, and not p, is sensitive, the redintegrative process may be nonepisodic (within abstract lexical memory)

Theoretical account

- Words have their own episodic representations (numbered circles)
- All phrases equally well bound to experiment for recall (**p parameter**)
- **Phrases episodic representations** are links between words and context (large numbered circle connected to both words)
- Strength of links (dashed lines) between experimental episode and the words controls ease of recall of words, which varies based on lexical frequency, concreteness, etc.
- Words have long-term memory links that create abstract, **non-episodic representations of phrases** (solid bar between two words) that increase as a function of phrase frequency
 - retrieval of one word cues the retrieval of the other (**q parameter**)
 - long-term memory helps with pattern completion (redintegration)

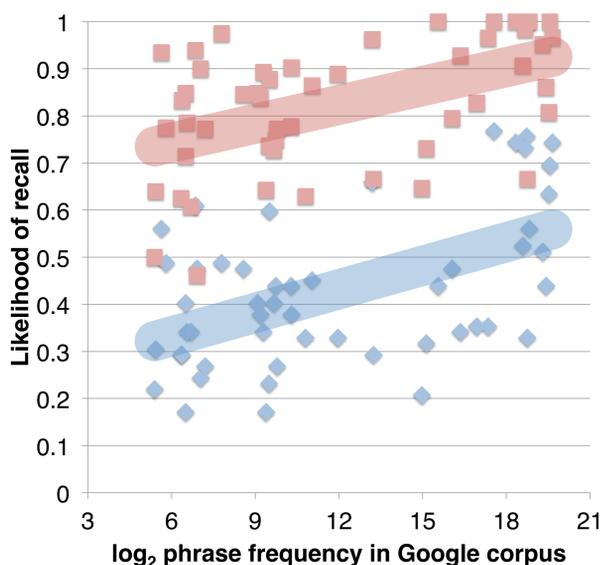
Phrase frequency benefits redintegration, but not retrieval during production.



Experiment 1

Phrases like alcoholic beverages, psychic nephew

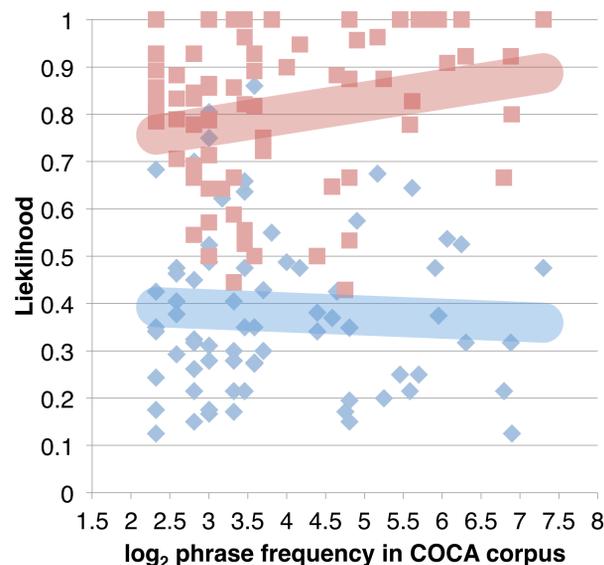
Participants write down phrases. Likelihood of at least partial (**p**) and complete recall (**q**). Retrieval at all levels is affected by concreteness and frequency. Because of this, high frequency phrases are better remembered.



Experiment 2

Phrases like current governor, strong opinion

Participants write down phrases. Likelihood of at least partial (**p**) and complete recall (**q**) of phrases. High frequency phrases are not always better remembered, but are more likely to be recalled completely.



Experiment 3

Phrases like current governor, strong opinion

Participants write down words. Likelihood of at least partial (**p**) and complete recall (**q**). High frequency phrases are not always better remembered, but are more likely to be recalled completely.

