Effects of diversity of narrative context on the early stages of novel word learning

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Introduction

- High quality lexical representations are built up over time through repeated exposures to words in context (Nation, 2017).
- Studies with familiar words have found a processing benefit for words that occur in diverse contexts (Adelman et al., 2006; Johns et al., 2012).
- Some studies of unfamiliar word learning have found the same (Frances et al., 2020); others have found a benefit for words that occur in less diverse contexts in the early stages of word learning (Mak et al., 2021).
- Contextual diversity and polysemy are hard to tease apart in natural language, words with different senses tend to occur in a wider range of contexts, e.g.:   "Dockyard"   vs.   "Harbour"

Aims

- Investigate how diversity of narrative context affects development of lexical representations in the earliest stages of word learning,
- Disentangle effects of contextual diversity from polysemy.

Predictions

Diversity of narrative context will affect learning of word forms and meanings; two possibilities:

(1) High contextual diversity may be better for word learning as it enables stronger lexical organisation and flexible, generalised word meanings.

(2) Low contextual diversity may be better for word learning as it creates stronger lexical representations enabling word meanings to be discriminated.

Method

Participants: $N = 100$ (age: $M = 31.80$; $SD = 5.43$; range = 19-40); 72 female, 28 male.

Web-based; within-subjects; participants learned 8 new words; 4 versions.

Stimuli: 16 pseudowords with invented meanings; semantic properties held constant across diversity conditions.

Low contextual diversity: Single narrative context

Claire was a secondary school student. She was in her last year and would soon be leaving for college. Claire really enjoyed her time at school. She knew she would miss her school friends, her home town, and even her classes. She particularly enjoyed science and was fascinated by understanding how things work the way they do. Her latest project for her biology class was to examine a **veak**. This was a type of **cockroach** that *only lives in New Zealand*.

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Before the end of the day, Claire needed to hand in an essay to her history teacher. They were working on the Cold War and the role of the Soviet Union. Claire hoped she would get a good mark on this essay as she was rather disappointed with her previous result. Claire also needed to head back to the science classroom to take some pictures for a presentation she would be doing on her research. But she remembered to be careful when handling the **veak** because *they carry disease*, so she used rubber gloves.
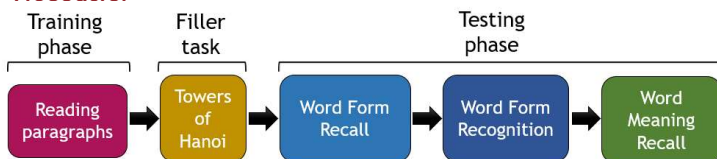
High contextual diversity: Multiple narrative contexts

Claire was a secondary school student. She was in her last year and would soon be leaving for college. Claire really enjoyed her time at school. She knew she would miss her school friends, her home town, and even her classes. She particularly enjoyed science and was fascinated by understanding how things work the way they do. Her latest project for her biology class was to examine a **veak**. This was a type of **cockroach** that *only lives in New Zealand*.

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Seth was having a terrible weekend. On Saturday morning, he woke up ill with a sore throat and runny nose. Later that day, Seth walked into his garden to find that all his plant pots had been knocked over. It was probably his next-door neighbour's mischievous cat! And then on Sunday, Seth's son woke up him up to remove a veak he found. He needed to be careful because *they carry disease*. Unfortunately, Seth discovered his home was in fact infested and he would need an exterminator.

Procedure:

Training phase → Reading paragraphs → Filler task → Towers of Hanoi → Testing phase → Word Form Recall → Word Form Recognition → Word Meaning Recall

Measures:

- Word form recall:
  Levenshtein distance comparing typed response to true spelling.
- Word form recognition:
  Binary accuracy – correct item selected (1) or not (0).
- Word meaning recall:
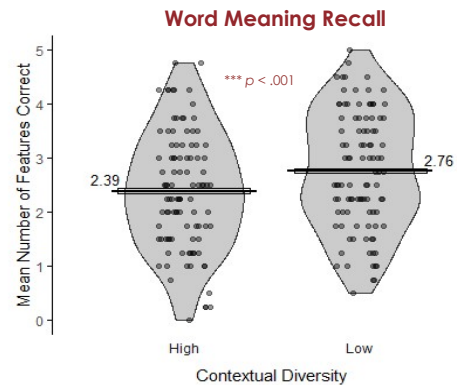 Number of semantic features correctly recalled (out of 5 total per item).

Results

Data were analysed using linear mixed effects modelling (Barr et al., 2013).

Analyses were supplemented with Bayes Factors (Wagenmakers, 2007).
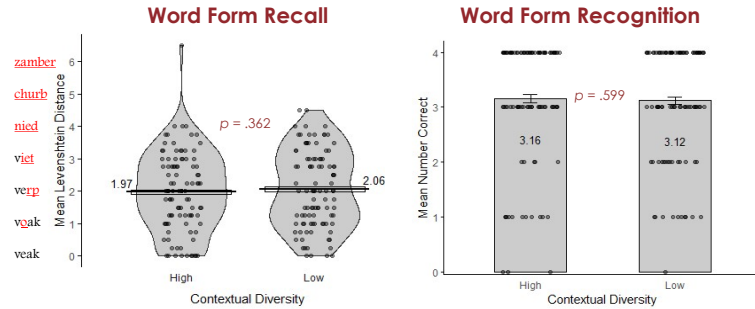
Word Form Recall

$BF_{10} = 0.14$
Moderate evidence for H0

Word Form Recognition

$BF_{10} = 0.23$
Moderate evidence for H0

Word Meaning Recall

$BF_{10} > 100$
Extreme evidence for H1

- Diversity of narrative context did not affect word form learning.
- More semantic features were correctly recalled for words learned in a single narrative context.

Discussion

- Less diversity of narrative context is beneficial for acquiring word meanings in the earliest stages of word learning.
- We observed this benefit for low contextual diversity while controlling for variability in word meanings, which normally co-occurs in natural language.
- The benefit for lower contextual diversity in the early stages of word learning may reflect:
  - Enhanced integration of new word meaning into a single, coherent episodic representation.
  - Reduction in cognitive resources required to process consistent narratives, facilitating simultaneous acquisition of new word meanings.

References

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