Changing Signs: Testing How Sound-Symbolism Supports Early Word Learning

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Introduction

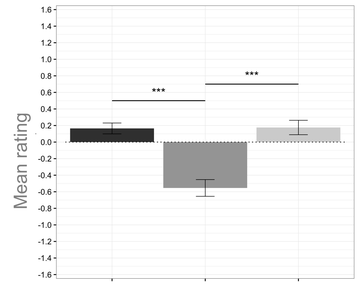
- Human language contains both arbitrary (e.g. *'dog'*) and non-arbitrary (e.g. *'woof'*) mappings between a word's sound form and its meaning [1]
- Sound-symbolism, a form of non-arbitrariness, has been proposed to play an important role in early language acquisition as it allows the learner to bootstrap their way into a linguistic system [2]. But as the language develops, a predominantly arbitrary linguistic system is more efficient for the learner and user [3]
- Previous research has suggested that when the vocabulary is large, sound-symbolism benefits learning of broad categories [4] but when the vocabulary is small, then sound-symbolism benefits learning of individual word meanings within the broad categories [5]
- Yet, no clear evidence for how arbitrariness and sound-symbolism independently contribute to word learning at different stages of language development

Hypotheses

- Sound-symbolism will promote the learning of broad categories within the language - more so than arbitrariness – regardless of vocabulary size
- As the vocabulary size grows, arbitrariness will provide a more suitable system for learning individual words, in comparison to a sound-symbolic system

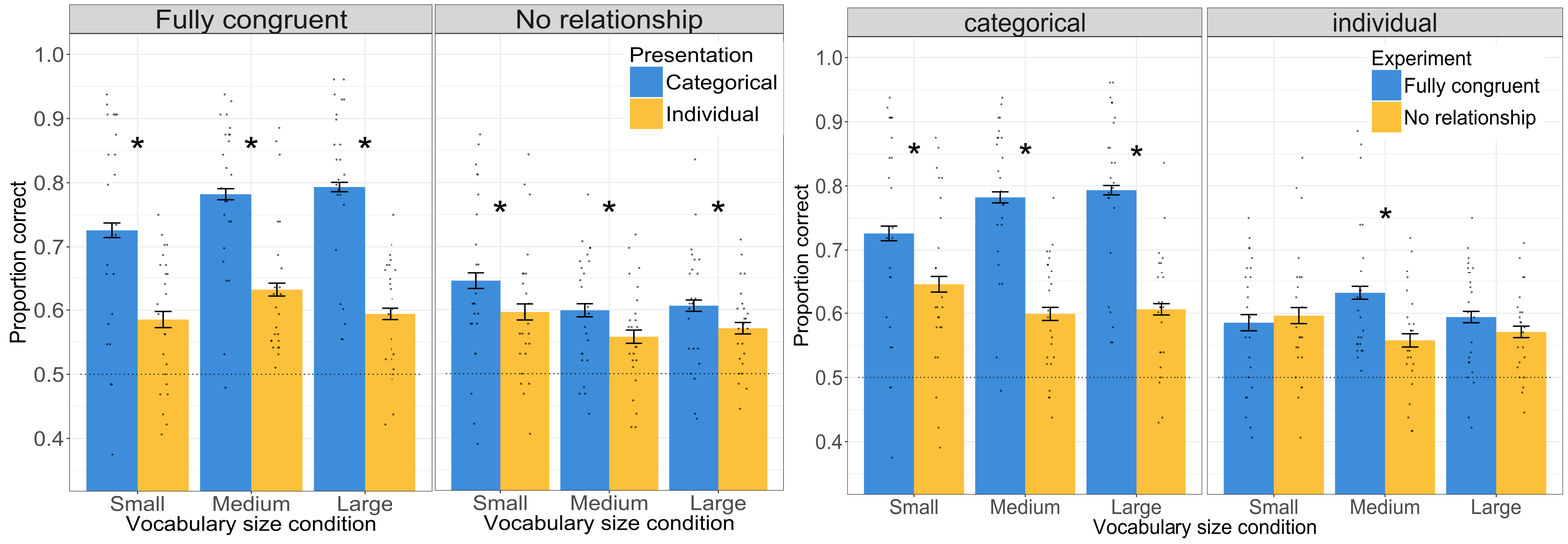
Method

- Experiment 1: Fully sound-symbolic language – auditory words map reliably to either a rounded or angular shape with a sound-symbolically congruent mapping
- Experiment 2: Fully arbitrary language – auditory words map reliably to either a rounded or angular shape with no sound-symbolic relationship
- Sound-symbolic classification derived from experimentally normed set of sounds
- Cross situational learning paradigm, where no explicit feedback is given
- Vocabulary sizes – small (8 words) medium (12 words) and large (16 words)
- Presentation type – categorical learning or individual word learning
- Analysis – `glmer(accuracy ~ vocabulary size + presentation type + vocab size*presentation type + (1|subject) + (1|item), family = "binominal")`



Mean ratings for presentation of auditory stimuli designed to incorporate either rounded or angular phonetic characteristics (Exp 1) and when there is no intended relationship (Exp 2). Positive values represent preference for rounded shapes, negative values represent preference for angular shapes.

Results



Experiment 1
- Presentation type - $\chi2(1) = 500.93$, $p < .001$***
- Vocabulary size - $\chi2(2) = 2.57$, $p = .28$
- Presentation type*vocabulary size - $\chi2(4) = 17.529$, $p = .002$***

Experiment 2
- Presentation type - $\chi2(1) = 23.52$, $p < .001$***
- Vocabulary size - $\chi2(2) = 3.92$, $p = .14$
- Presentation type*vocabulary size - $\chi2(4) = 4.52$, $p = .34$

Across experiment comparison
- Presentation type - $\chi2(1) = 350.26$, $p < .001$***
- Vocabulary size - $\chi2(2) = 0.01$, $p = .99$
- Experiment - $\chi2(2) = 30.66$, $p < .001$***
- Vocab size*presentation type*experiment - $\chi2(8) = 22.16$, $p = .005$**

Conclusions

- Sound-symbolism benefits learning of categories, but particularly in a large vocabulary size. This category learning effect reduced dramatically in the arbitrary language, highlighting the benefits of sound-symbolism
- No difference between sound-symbolic and arbitrary languages for individual word learning, this could indicate that the theoretical arbitrary advantage for large vocabularies may depend on having some systematicity present in the language

References

[1] Dingemanse, Blasi, Lupyan, Christiansen, & Monaghan (2015). Arbitrariness, iconicity, and systematicity in language. *TiCS*.
[2] Imai & Kita (2014). The sound symbolism bootstrapping hypothesis for language acquisition and language evolution. *Phil Trans B*.
[3] Gasser, M (2004). The origins of arbitrariness in language. In *Proc Cognitive Science Society*.
[4] Monaghan, Mattock, & Walker (2012). The role of sound symbolism in language learning. *JEP:LMC*.
[5] Brand, Monaghan, & Walker (2017). The changing role of sound-Symbolism for small versus large vocabularies. *Cognitive Science*.

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