

Consistency is key:

Repetition versus variability in a novel verb-learning task

Sabrina Horvath & Sudha Arunachalam, Boston University

BOSTON
UNIVERSITY

Introduction

- Two-year-olds learn a novel verb when it is surrounded by content nouns (e.g., "The boy is *pilking* a balloon"), better than pronouns (e.g., "He is *pilking* it") [2-3]
- But pronouns are very frequent in the input [5] and are helpful for identifying word boundaries [12] and using novel verbs productively [4]
- Variability helps learners, including in word-learning tasks [14-15,16]

Hypothesis 1: Variability is better than repetition: Children will learn a novel verb's meaning better given both content nouns and pronoun contexts as compared to only content noun contexts.

However, this may not be uniform across children.

- Late Talkers (LTs):** 2-year-olds whose vocabularies are below 15th percentile, without comorbid deficits [6]
 - At 18 months: slower to identify familiar nouns [9]
 - At 30 months: do not use fast-mapping to learn novel nouns [7]
 - May acquire different types of verbs [10]

Hypothesis 2: Because variability may increase processing load, LTs may benefit more from repetition than typically-developing children (TDs).

Participants

- ages 24 to 35 months, mean age 28 months
- TD N = 18, LT N = 7
- LTs identified by scores below 15th percentile on MacArthur-Bates Communicative Development Inventories (MCDI-2) [8]
- LT and TD groups differ on measures of expressive and receptive language (MCDI-2, Mullen Scales of Early Learning, Preschool Language Scales)

Methods

	Familiarization	Preview	Prompt	Test
Visual				
Auditory	<p>Same condition: The girl is gonna <i>ziff</i> the truck. The girl is <i>ziffing</i> the truck!</p> <p>Varied condition: The girl is gonna <i>ziff</i> the truck. She is <i>ziffing</i> it!</p>	Look!	Let's find <i>ziffing</i> !	Where's <i>ziffing</i> ?

Paradigm similar to other verb learning studies, e.g., Imai et al. (2005), Arunachalam & Waxman (2015). In Arunachalam & Waxman (2015), children succeeded with stimuli similar to the **Same Condition**, but with only one exposure.

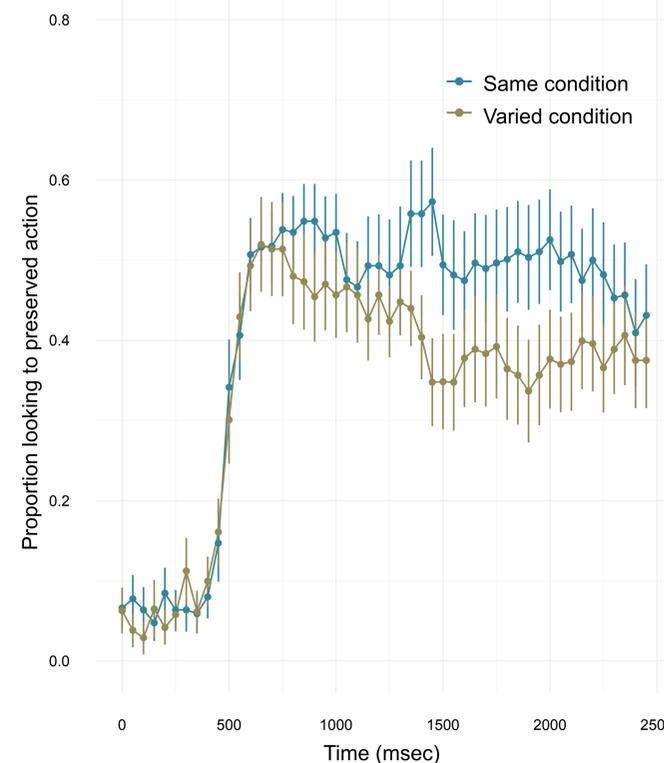
- Within-subject design, 4 trials each of 2 conditions, 8 exposures during Familiarization
 - Same Condition:** only content nouns
 - Varied Condition:** content nouns and pronouns

Analyses

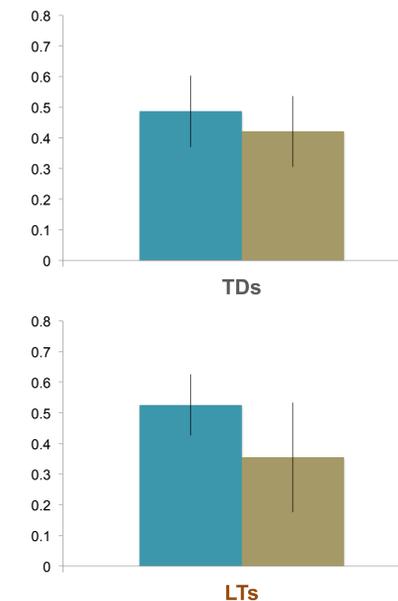
- Time window of analysis: 1-2.5 seconds (following [1])
- Mixed-effects regression, with
 - Random effects of participant (with a random slope for time) and trial (with a random slope for time)
 - Fixed effects of time by group by condition

Results

Same versus Varied Conditions



TDs versus LTs



Main effect of condition ($t = 2.3, p = 0.01$), but not of group ($t = 1.4, p = 0.09, n.s.$).

Conclusions

Main finding:

- Children perform better when given **only content nouns**, rather than a **mixture of content nouns and pronouns**
- For 2-year olds, the benefits of **content nouns** in acquiring verb meaning override potential benefits of variability.

Typically-Developing children vs. Late Talkers:

- No significant difference between TDs and LTs, no interaction
- Group difference trends in expected direction ($p = 0.09$), and may emerge with a larger sample size.

Acknowledgements

This work was funded by NIH K01DC01306 to SA, an American Speech-Language-Hearing Foundation New Century Scholars Research Grant to SA, and an American Speech-Language-Hearing Foundation Student Research Grant in Early Childhood Language Development (supported by the Noel and Arlene Matkin Memorial Fund) to SH. Thank you to the families who participated, and to members of the Boston University Child Language Lab.

References

- [1] Arunachalam, S. (2013). Two-year-olds can begin to acquire verb meanings in socially impoverished contexts. *Cognition*, 129, 569-573. [2] Arunachalam, S., & Waxman, S. R. (2011). Grammatical form and semantic context in verb learning. *Language Learning and Development*, 7(3), 169-184. [3] Arunachalam, S., & Waxman, S. R. (2015). Let's see a boy and a balloon: Argument labels and syntactic frame in verb learning. *Language Acquisition*, 22, 117-131. [4] Childers, J., & Tomasello, M. (2001). The role of pronouns in young children's acquisition of the English transitive construction. *Developmental Psychology*, 37(6), 739-748. [5] Cameron-Faulkner, T., Lieven, E. V. M., & Tomasello, M. (2003). A construction based analysis of child directed speech. *Cognitive Science*, 27, 843-873. [6] Desmarais, C., Sylvestre, A., Meyer, F., Bairati, I., & Roulea, N. (2008). Systematic review of the literature on characteristics of late-talking toddlers. *International Journal of Language and Communication Disorders*, 43(4), 361-389. [7] Ellis Weismer, S., Venker, C.E., Evans, J.L., & Moyle, M.J. (2013). Fast mapping in late-talking toddlers. *Applied Psycholinguistics*, 34, 69-89. [8] Fenson, L., Marchman, V. A., Thal, D. J., Dale, P., Reznick, J. S., & Bates, E. (2007). *MacArthur Communicative Development Inventories: User's guide and technical manual* (2nd ed.). Baltimore, MD: Brookes. [9] Fernald, A., & Marchman, V.A. (2012). Individual differences in lexical processing at 18 months predict vocabulary growth in typically developing and late-talking toddlers. *Child Development*, 83(1), 203-222. [10] Horvath, S., Rescorla, L., & Arunachalam, S. (under revision). The syntactic and semantic features of two-year olds' verb vocabularies: A comparison of typically developing children and late talkers. [11] Imai, M., Haryu, E., & Okada, H. (2005). Mapping novel nouns and verbs onto dynamic action events: Are verb meanings easier to learn than noun meanings for Japanese children? *Child Development*, 76(2), 340-355. [12] Mintz, T. (2003). Frequent frames as a cue for grammatical categories in child directed speech. *Cognition*, 90, 91-117. [13] Mullen, E. (1995). Mullen scales of early learning. Bloomington, MN, Pearson Clinical Assessments. [14] Naigles, L. (1996). The use of multiple frames in verb learning via syntactic bootstrapping. *Cognition*, 58, 221-251. [15] Perry, L.K., Samuelson, L.K., Malloy, L.M., & Schiffer, R.N. (2010). Learn locally, think globally: Exemplar variability supports higher-order generalization and word learning. *Psychological Science*, 21(12), 1894-1902. [16] Waxman, S. R., & Kilbanoff, R. S. (2000). The role of comparison in the extension of novel adjectives. *Developmental psychology*, 36(5), 571. [17] Zimmerman, I.R., Steiner, V.G., Pond, R.E. et al. (2011). *Preschool Language Scales*, 5th edition. Bloomington, M.N., Pearson/PsychCorp.