After is easier: How linguistic timing impacts verb learning in preschoolers with DLD

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Introduction

Overview
- Verb learning particularly challenging for children with DLD (e.g., Oetting, 1999)
- Subtle changes to the learning environment impact whether children learn new verbs (Horvath & Arunachalam, 2019)
- Important to understand optimal contexts for teaching verbs during therapy

Research question
Is it easier for children to learn novel verbs if they hear the verb before seeing the referent action, or after?

Prior research
- For typically developing children (TDs), what is easier depends on verb meaning (Ambalu et al., 1997; Tomasello & Krueger 1992)
  - Manner verbs
    - Encode how something happens (e.g., "run")
    - More easily learned if introduced before referent action
  - Result verbs
    - Encode an event endstate (e.g., "close")
    - More easily learned if introduced after referent action
- For children with DLD, timing impacts noun learning (Pomper et al., 2022)
  - Nouns more easily learned when presented separately from visual information versus concurrently
  - Nouns more easily learned if presented before rather than after referent objects
- Limitations on prior research
  - Has only considered verb learning in TDs, but children with or at risk for DLD have differing knowledge of manner/result verb meanings (Horvath et al., 2019; 2021; Penner et al., 2003)
  - Confound of variable verb morphology, which may have impacted performance (Morphological Bootstrapping: Wagner et al., 2009)

Methods

Participants
- $N = 8$ preschoolers with DLD (2 female, 6 male)
- Age: $M = 61$ mo; $SD = 5$ mo,
- DLD confirmed via testing
  - Language: <87 on SPELT-P2 ($M = 73$, $SD = 17$)
  - Non-verbal intelligence: >75 on KABC ($M = 103$, $SD = 17$)

Conditions (within-subjects)
- **Before:** Verb introduced before referent action
- **After:** Verb introduced after referent action

Design
- 8 pairs of novel verbs, each featuring the same actor and object with two different actions
- Verbs in the pair introduced in same condition

Training Phase					
	⭐	[video]	⭐	⭐	[video]	⭐
Before	*Wow! The girl can juff the bowl! (x2)*		*Did you see?*	*Wow! The girl can spoov the bowl! (x2)*		*How fun!*
After	*Look at this!*		*Wow! The girl can juff the bowl! (x2)*	*Let's watch!*		*Wow! The girl can spoov the bowl! (x2)*

	Recall Phase		Generalization Phase	
	[image]	[image]	[image]	[image]
Before				
After	*Which girl can juff the bowl?*	*Which girl can spoov the bowl?*	*Which boy can spoov the bowl?*	*Which boy can juff the bowl?*

Trial structure. In Training, children were introduced to two novel verbs. Then, children were asked to discriminate between the two training videos by pointing (Recall) and to generalize the novel verbs to a new agent (Generalization).
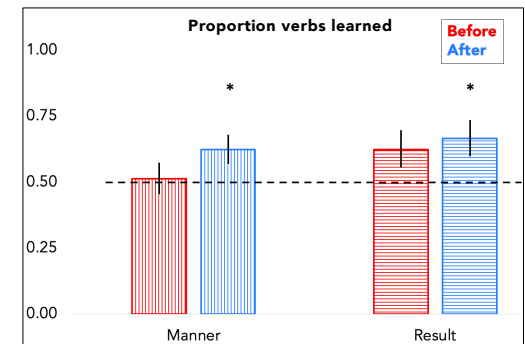
Results

Overall, children learned 60% of the verbs queried

Manner verbs
- Overall: X^2 (1, $N = 152$) = 3.2, $p = 0.07$, *n.s.*
- Before: X^2 (1, $N = 72$) = .06, $p = 0.8$, *n.s.*
- After: X^2 (1, $N = 80$) = 5, $p = 0.03$*

Result verbs
- Overall: X^2 (1, $N = 96$) = 8.2, $p = 0.004$*
- Before: X^2 (1, $N = 48$) = 3, $p = 0.08$, *n.s.*
- After: X^2 (1, $N = 48$) = 5, $p = 0.02$*

Conclusions

Main findings
- Unlike TDs (Ambalu et al., 1997), children with DLD more easily learn verbs if they are heard after rather than before the referent action, irrespective of verb meaning
- Optimal timing different for verbs versus nouns (Pomper et al., 2022)
- Children with DLD more easily learn result than manner verbs (consistent with Horvath et al., 2019; 2022)

Future directions
- Current research grant with late talkers and typically developing children: 1R21DC020785-01