

## **Infants learn combinatorial properties of verbs from listening**

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On the syntactic bootstrapping hypothesis, knowledge of verbs' combinatorial behavior guides early sentence comprehension: For example, two-year-olds assign different interpretations to novel transitive versus intransitive verbs [1]. Syntactic bootstrapping requires that children learn about verb syntax independent of other information about verb meaning. Recent experiments yield strong evidence for the independent encoding of verb syntax. 28-month-olds heard dialogues in which two people described unseen events using a novel verb; children remembered the syntactic information encountered in these dialogues, and used it to interpret the verb when later encountering it in a referential context [2]. Children who had heard the verb used transitively looked longer at a two-participant action (relative to a one-participant action) than did children who had heard the new verb used intransitively. 21-month-olds succeeded in a similar task, when the dialogues immediately preceded each novel-verb test phase [3]. The present study built on this evidence to explore infants' independent encoding of verb syntax: We asked whether 22-month-olds could learn about a verb's syntactic privileges simply through hearing its use in sentences, and (1) attach their learning from the dialogue phase to a new lexical entry for the unknown verb, (2) retain that information in memory over a delay, and (3) retrieve that information only if the same verb is invoked in later test trials.

Infants watched dialogues in which interlocutors used a made-up verb in transitive ("Jane blicked the baby!") or intransitive sentences ("Jane blicked!"); Fig-1). Next, infants received two familiar-verb practice trials presented without dialogues; these instituted a brief delay between dialogue and test. Finally, in test trials, infants saw two simultaneously-presented events: one showed a two-participant causal action and the other a one-participant action. The one-participant action was enacted by one person in Experiment 1 and by two people simultaneously in Experiment 2 (to control for the number of people in each video). We tested children's *lexical encoding* of what they learned during the dialogues by comparing experimental conditions in which children heard the novel verb from the dialogues in isolation ("Find blicking!"), to control conditions in which infants heard neutral audio at test ("What's happening?"; Expt-1), or heard a different novel verb ("Find kradding!"; Expt-2).

Infants' interpretations of the novel verb were guided by the dialogues: Those who had heard the verb used transitively looked reliably longer at the two-participant event when they heard the verb again than did those who had heard the verb used intransitively. No such dialogue effect appeared if infants heard no novel verb (Expt-1) or heard the wrong novel verb (Expt-2).

Thus 22-month-olds encoded information about verb syntax, independent of access to referential information about verb meaning: they learned combinatorial facts about an unknown verb via listening experience alone. Crucially, infants attached this information to a tentative lexical entry for the novel verb they heard in the dialogues, and retained it over a delay. These data suggest that combinatorial information about otherwise unknown words may pervade the infant lexicon, providing useful constraints on later word interpretation.

**Figure 1:** Sample dialogue and test trials for Experiments 1 and 2.

**Dialogue Phase:**



Transitive dialogue

A: Guess what? Jane blicked the baby!

B: Hmm. She blicked the baby?

A: And Bill was blicking the duck.

B: Yeah, he was blicking the duck.

Intransitive dialogue

A: Guess what? Jane blicked!

B: Hmm. She blicked?

A: And Bill was blicking.

B: Yeah, he was blicking.

**Experiment 1 Test Phase:**

Two-participant causal action



One-participant action



Experimental condition: "Find blicking!"  
Control condition: "What's happening?"

**Experiment 2 Test Phase:**

Two-participant causal action



One-participant action



Experimental condition: "Find blicking!"  
Control condition: "Find kradding!"

**References:**

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- [2] Yuan, S. & Fisher, C. (2009). "Really? She blicked the baby?": Two-year-olds learn combinatorial facts about verbs by listening. *Psychological Science* 20, 619–626.
- [3] Arunachalam, S., Escovar, E., Hansen, M. & Waxman S.R. (2011). Verb learning from syntax alone at 21 months. To appear in BUCLD 35 Proceedings.