Children's Acquisition of Nouns That Denote Events

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1. Introduction

"We're off on a robinson!" said Lila Gleitman while out on a boat with her late husband Henry Gleitman and some friends. In that moment, she recognized that the word "robinson," carried in her lexicon all the way into adulthood, did not mean what she thought it meant. Apparently, she had taken the titles of two childhood classics, *Robinson Crusoe* and *The Swiss Family Robinson*, and posited a lexical representation in which "robinson" meant something like "trip or adventure by boat." This anecdote led us to think about the potential difficulty of acquiring words that have nominal syntax, but denote events (like trips) rather than entities (like adventurers). In this paper, we discuss three studies aimed at understanding whether these words are difficult to acquire and what cues in the input might be available to help children acquire them.

Importantly, toddlers in the early stages of word learning appreciate links between nouns and object or animate entity categories (e.g., Waxman & Booth, 2001), and between verbs and event categories (e.g., He & Lidz, 2017). But some words cut across these links, and their acquisition is poorly understood. Learning nouns that denote categories of events might be particularly difficult for several reasons. First, the very fact that they violate the predominant mapping of nouns to entity categories may lead to initial mis-mappings—mapping these words to entity rather than event concepts. Second, they should be difficult for the same reasons that verb learning is difficult, because their referents share the same properties as the referents of verbs. Early-acquired verbs generally denote events that unfold over time, but are rarely uttered when the events are ongoing (e.g., Tomasello & Kruger, 1992), and the events involve relations among multiple event participants which can be construed in multiple ways (e.g., Fisher, Hall, Rakowitz, & Gleitman, 1994). These facts are thought to impede verb acquisition (e.g., Gentner, 1978; Gleitman, 1990), and should pose the same challenge for the acquisition of nouns that denote event concepts. Third, while verb acquisition is understood to benefit from argument structure via the learning mechanism of syntactic bootstrapping (Gleitman, 1990), the

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event-denoting nouns that are acquired in early childhood do not appear with arguments, and therefore lack this helpful information.

Several event nominals appear on the MacArthur-Bates Communicative Development Inventories (1993), like "nap," "party," "game," "picnic," and "bath," and are thus expected to be learned in the first few years of life. These early acquired nominals, or *simple event nominals*, are to be distinguished from *complex event nominals* that have nominalizing morphology and can appear with arguments (e.g., *the destruction of the city*) (see, e.g., Borer, 1999; Grimshaw, 1990; Moulton, 2014; Roy & Soare, 2013 for discussion of the syntactic and semantic differences between the two types). But because the referents of both types of event nominals are events that unfold over time, both can appear with temporal predicates (e.g., *The nap/destruction took 3 hours*). In contrast, nouns that denote objects typically do not appear with such predicates (e.g., *#The bagel took 3 hours*). (Note that coercion is possible, and we can imagine situations in which the latter could be uttered, such as in the context of a 3-hour bagel-eating event. But here, the nominal denotes the event of eating the bagel rather than the object itself.) We focus on the acquisition of simple event nominals in the present work.

The simple event nominals that we think are learned in early childhood are a diverse group. Some but not all are ambicategorial, surfacing as either nouns or verbs (e.g., "a nap", "to nap") (although some of these are infrequent or marked in their verb use, like "to game"). Some are polysemous, denoting either events (e.g., "The picnic is from 2 to 4 p.m.") or objects (e.g., "Someone left a picnic on the grass"). Both of these properties might be expected to cause challenges for learners—some ambicategorial words denote instruments rather than events in their nominal form (e.g., *hammer*), and polysemy between object and event interpretations would of course dilute the evidence children have that a nominal could denote an event.

But despite the many hypothesized challenges of acquiring simple event nominals, they appear in productive vocabularies by about 20 months of age (Nelson, Hampson, & Shaw, 1993), and 1- and 2-year-olds can use ambicategorial words like "kiss" flexibly as both nouns and verbs (though less flexibly than their caregivers) (Barner, 2001). We were struck by this apparent precocity: simple event nominals should be especially difficult to acquire, but yet children seem to acquire them relatively early. Therefore, we conducted three studies to ask the following three questions: (1) Do children have correct, eventive representations for early-acquired simple event nominals (Study 1)? (2) What cues are available in the input and accessible to adults, at least, to cue an event interpretation (Study 2)? and (3) Can children use some of these cues to assign an event interpretation to a noun in a novel word learning task (Study 3)? The current paper provides an overview of these three studies.

2. Study 1: Are early event nominal representations adult-like?

Bloom and Kelemen (1995:3) write in a footnote:

> One must be cautious when interpreting data from spontaneous speech, since children need not know the correct meaning of a word to use it appropriately. It is quite likely, for instance, that children's understanding of word like nap might differ in subtle ways from that of adults. But it is wildly improbable that all of their usages of such words are entirely confused, such that they think that they are all names for object kinds. We know of no reported cases where children were observed to treat words like nap and spanking as referring to kinds of objects, such that nap meant "bed" or spanking meant "hand."

We generally agree with this appraisal, at least for children old enough to use these words productively. We further suggest that there are likely ways in which children's representations could be non-adult-like short of the true misrepresentation of believing that, e.g., "nap" and "bed" have identical denotations. For example, one common error children make in early verb acquisition is to fail to extend novel verbs to apply to objects beyond the one with which they were first introduced. In several studies, children introduced to a novel verb in the context of one object (e.g., a man waving a balloon) failed, under certain circumstances, to identify the verb's referent when a new object was involved (e.g., a man waving a spoon) (e.g., Arunachalam & Waxman, 2011, 2015; Imai et al., 2008; Imai, Haryu, & Okada, 2005; Kersten & Smith, 2002). One interpretation of this pattern is that children's initial representation for the verb entails the specific object with which it was first encountered. Extending this to event nominal acquisition, we might predict that children would expect a particular object (e.g., a bed in the case of napping) to be a required event participant, even if they do not systematically believe that the nominal's denotation is equivalent to that event participant. (Fortunately, in verb learning studies, children recover from this error when provided with informative linguistic contexts (Arunachalam & Waxman, 2011, 2015, Imai et al., 2008, 2005; Syrett, Arunachalam, & Waxman, 2014), a fact we take advantage of in Study 3.)

Our goal in this first study was to evaluate whether children's representations for familiar, early-acquired event nominals are adult-like, and if not, whether children have object denotations rather than event denotations, or whether they correctly have event denotations but incorrectly require particular objects to be involved. We tested these possibilities in two experiments which differed slightly in their stimuli.

2.1. Experiment 1a

Participants in Experiment 1a (N = 15) were ages 2;2 to 3;5 (mean age 2;7). They were recruited from the greater Boston area and were reported by their parents to be exposed to English 70% or more of the time; and to have no disorders affecting vision, hearing, language, or communication.

2.1.1. Method

We presented preschoolers with familiar event nouns (*nap, party, bath, picnic*). Children were told that a puppet (George Giraffe) wanted to learn the meanings of some English words. On each trial, George "whispered" to the experimenter the word he wanted to learn, and the child was asked to teach the word's meaning by pointing to the correct picture given a display of pictures. The experimenter would relay George's desire by saying, e.g., "George Giraffe wants to learn the word *nap*. The word is *nap*. Can you point?" Children's first point on each trial was recorded and taken as the dependent measure. Children chose from among four pictures on each trial. In the target picture (e.g., *nap*), the target event was depicted minimally—without salient objects that are typically present (e.g., a boy, sleeping on a white surface; no bed, pillow, or blanket was present). One distractor depicted an agent or agents and canonically-associated object, but not the target event (e.g., a woman sitting on a bed with eyes open). The other two distractors depicted related objects, one that we expected would be strongly associated with the event (e.g., a made bed, with no evidence that anyone slept in it), and the other less so (e.g., a moon). See Figure 1. On filler trials, children were asked to identify non-prototypical exemplars of objects (e.g., for the target *bird*, the target was a goose), and similarly to event nominal trials, the distractors included canonically-associated objects (e.g., nest, eggs). In pilot work, we tested *nap, party, bath, picnic*, and *game*; the results reported below include only *nap, party,* and *bath*.

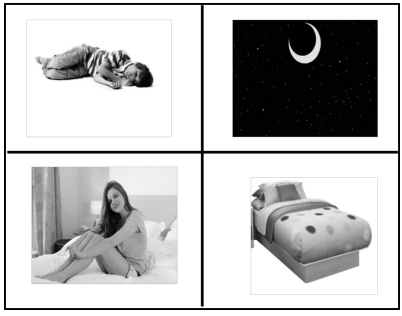

Fig 1. Stimuli for "nap" trial, Study 1, Experiment 1a

2.1.2. Results

Given that four objects were presented, chance performance was 25%. Children performed nearly at ceiling on filler trials (94%), and on event nominal trials, they performed significantly above chance (58%, $t(14) = 4.04$, $p < 0.01$). However, on almost all event nominal trials, children selected either the target (e.g., child sleeping, but not in a bed) or the most closely associated distractor (e.g., bed alone). Therefore, if we remove the other two distractors from consideration, instead considering 50% to be chance performance, children were

indeed at chance in choosing between the target and distractor ($t(14) = 0.96$, $p = 0.35$). Adults performed at ceiling in this task, and when asked to rate each picture for how well it depicted the target word on a scale of 1 to 5, they rated the target picture at a 4 or 5 on nearly all trials (96%), similarly to their ratings for the non-prototypical targets on filler trials (e.g., goose for bird). As an additional control, a subset of the children was given verb trials to ensure that they could identify an event referent from a static picture. For example, children were asked to find "drinking" given the choice between a boy drinking orange juice and a glass of juice; they were nearly at ceiling. Thus, the difference between children and adults in this task appears to be specifically with event nominals, as it does not surface with object nominals or with verbs.

2.2. Experiment 1b

Experiment 1b was intended as a partial replication with a more refined procedure to tease apart three possibilities: (a) Do children mistakenly represent the event nominal as denoting an object? (b) Do children correctly represent the nominal as denoting an event, but require a particular object be present? (c) Do they correctly represent the nominal as denoting an event, and does not require any particular objects?

2.2.1. Participants

Inclusion criteria were as in Experiment 1a. Participants ($N = 32$) ranged in age from 2;2 to 3;5 (mean age 2;10).

2.2.2. Method and predictions

The same method as in Experiment 1a was used, with the following differences. Children chose between just two pictures (since they had ignored two distractors in Experiment 1a), and we included only two critical trials: *nap* and *party*. There were two conditions: in the No Canonical Object condition, the target picture was, as in Experiment 1a, a depiction of the event without canonically-associated objects. The distractor was the most canonically associated object (based on pilot work and Experiment 1a) alone, with no animate agent. In the Canonical Object condition, the target picture was a canonical exemplar of the event—an agent engaged in the event with the canonically-associated object (e.g., boy sleeping in a bed); the distractor was the same as the No Canonical Object condition. See Figure 2. Filler trials were similar to Experiment 1a, but again with only two pictures.

If children mistakenly represent the event nominal as denoting an object, they should incorrectly prefer the bed in the No Canonical Object condition and should be at chance in the Canonical Object condition (as both depict a bed). If they correctly represent the nominal as denoting an event but require that a bed be present, they should be at chance in the No Canonical Object condition (because neither image depicts both sleeping and a bed) and should perform

above chance in the Canonical Object condition. If they have a correct representation, in which the nominal denotes an event, and does not require any particular objects, they should perform above chance in both conditions.

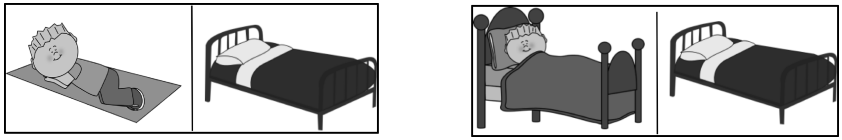

Fig 2. Left: Study 1 Experiment 1b No Canonical Object condition; Right: Study 1 Experiment 1b Canonical Object condition.

2.2.3. Results

In the No Canonical Object condition, children were at chance (57%, $t(14) = 0.62$, $p = 0.55$), replicating our results from Experiment 1 and affirming our conclusion that children do not identify events without canonical objects as good depictions of those events. In the Canonical Object condition, however, children chose the target significantly more often than chance (70%, $t(14) = 2.45$, $p < 0.03$), indicating that they did not see a bed alone as being as good of a response as a napper in a bed. They again performed near ceiling on filler trials (94% correct) and above chance on verb trials (75% correct). See Figure 3.

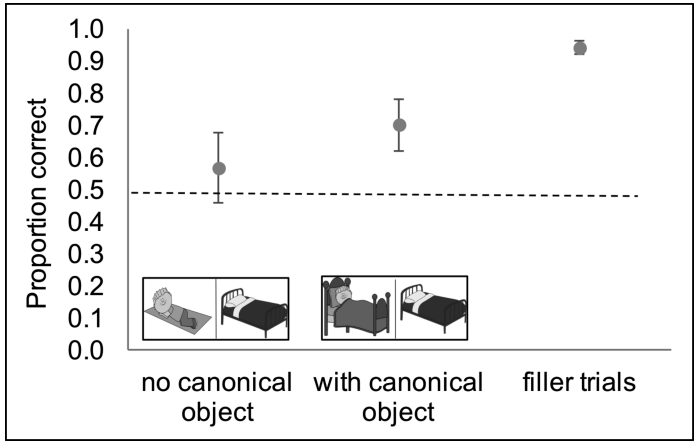

Fig 3. Results from Study 1 Experiment 1b, supporting the results of Study 1 Experiment 1a and further demonstrating that children can succeed when the event is depicted with a canonically-associated object.

2.3. Discussion

Taken together, Experiment 1a and the No Canonical Object condition of Experiment 1b indicate that children at this age do not have adult-like

representations of event nominals like *nap* and *party*; unlike adults, they do not identify depictions without canonically-associated objects as being exemplars of the event. However, as Bloom and Kelemen (1995) surmised, the Canonical Object condition of Experiment 1b demonstrates that nor is it the case that children at this age systematically confuse event nominals as denoting objects rather than events. Instead, we think the interpretation that children's early representations for these event nominals are (correctly) event representations, but that they (incorrectly) require certain objects to be present.

One important question is: why *bed*? Why might children require a bed to be present for a nap more than, say, a teddy bear or night light? Our choice of distractor object for these experiments came from the children themselves. We used pilot data from Experiment 1a to determine the appropriate stimuli for both experiments; some distractor objects proved better than others. For example, on the "party" trial, we piloted different images of parties as well as different distractor objects (cakes, balloons). We selected the two images most often chosen in pilot work (one of the party images, and a cake) for Experiment 1a, and this also informed our selection of a cake as the distractor for Experiment 1b. (This piloting also involved asking children to choose "which picture they liked best" to ensure that neither was simply more interesting than the other when no words were targeted.) Additional work needs to be done to determine what constitutes an exemplary "party" or "nap" for preschoolers, and why.

Our results indicate that, although even infants appreciate links between nouns and objects (e.g., Waxman & Booth, 2001), and verbs and events (e.g., He & Lidz, 2017), by 2 to 3 years of age they suspend these canonical links to link nominals to event concepts. We next asked what kinds of information support this ability. We tested adults in Study 2 and children in Study 3.

3. Study 2: Are there cues in the linguistic contexts in which event nominals appear that signal an event interpretation?

In Study 2, we were inspired by the Human Simulation Paradigm developed by Gillette, Gleitman, Gleitman, & Lederer (1999), in which adults were exposed to extralinguistic and/or linguistic information about an unknown word and were asked to guess its referent. Extralinguistic cues are likely to be heavily ambiguous for learners between object and event interpretations; that is, the extralinguistic contexts in which the word *nap* is uttered are likely highly similar to those in which the word *bed* is uttered. Therefore, we focused on linguistic cues, asking whether adults could guess that an unknown word was an event nominal only on the basis of the linguistic context in which it appeared.

3.1. Participants

Adults (N = 100) identifying as native English speakers participated, either in lab via a pencil-and-paper survey or on the Mechanical Turk platform through an online Qualtrics survey. For Mechanical Turk participants, only United States

IP addresses were accepted. Responses on filler trials were used to screen for poor quality or random responding; no participants were excluded on this basis.

3.2. Method

We extracted child-directed utterances from CHILDES North American English corpora (MacWhinney, 2000: Bates, Bernstein-Ratner, Bloom, Braunwald, Brent, Brown, Clark, Cornell, Demetras, Gleason, Higginson, Kuczaj, MacWhinney, McMillan, Morisset, New England, Post, Providence, Rollins, Sachs, Snow, Soderstrom, Suppes, Tardif, Valian, Van Houten, Warren, Weist) that contained any of four event nominals: *nap, party, bath,* and *picnic*; and any of four object nominals of comparable frequency in the CHILDES Parental Corpus (Li & Shirai, 2000; MacWhinney, 2000): *bed, cake, basket,* and *cracker*. We randomly selected 50 utterances per word, excluding and replacing single-word utterances or incomplete (e.g., interrupted) utterances. We also made minor edits to some utterances (e.g., replacing unusual proper names with more common ones, so as not to distract participants). Utterances were presented in written form, with a blank line replacing the target word. Adults were asked to fill in the blank with a single word. Filler sentences were also selected from the corpora and were similar except that the target word came from a variety of grammatical categories.

3.3. Results and Discussion

We first coded adults' guesses *precisely*—that is, a response was only marked correct if the exact target was guessed—and then by *category*, such that any event nominal was counted as accurate on an event nominal trial, and any object nominal was counted as accurate on an object nominal trial. We used linear mixed models to determine whether performance differed on object nominal and event nominal trials. For precise coding, adults were more accurate with event nominals (29% correct) than object nominals (17% correct), though the difference was not statistically significant ($p = 0.24$) and driven only by *party* and *nap*. For category coding, although performance increased overall (not surprisingly given the more generous coding) the reverse pattern held, and was statistically significant: adults were more accurate with object nominals (92% correct) than event nominals (67% correct) ($t = 3.00$, $p < 0.01$). See Figure 4. Because object nominals can occur in a variety of overlapping contexts, the contexts that object nominals occur in are not as highly constraining as many of the contexts that certain event nominals occur in, but adults are overall more likely to provide object nominal guesses than event nominal guesses. The results are suggestive that linguistic context alone can help adults identify whether a nominal is an event or object nominal, but perhaps only for certain nominals.

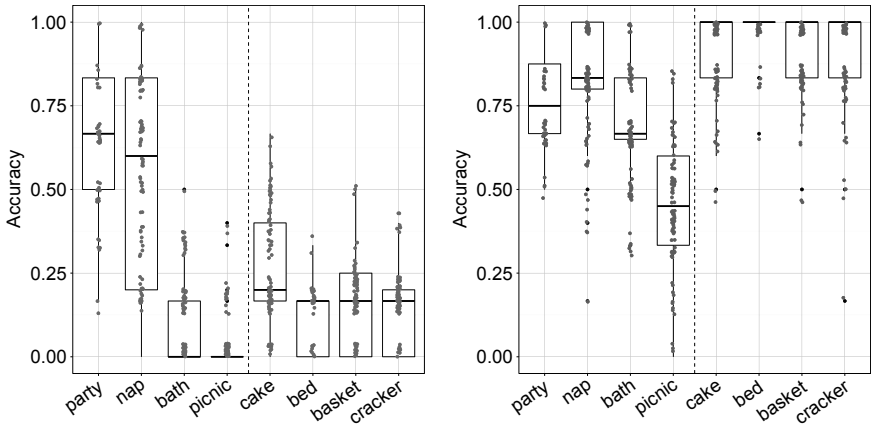

Fig 4. Results from Study 2. L: precise coding, R: category coding

We next examined the linguistic contexts themselves to look for particular features that seemed likely to cue an event nominal interpretation. We noticed that contexts that led to good performance with event nominals, both for precise and category coding, included at least one of a few features that are supported by theoretical and computational work, as well as by our own preliminary corpus work, as being good signals that a nominal denotes an event rather than an object. First, event nominals typically occur with a small set of light verbs (e.g., Wittenberg, Paczynski, Wiese, & Kuperberg, 2014), as in *take a nap/bath*, *have a party/picnic*. Second, because event nominals denote events that unfold over time, the presence of temporal language in the context may be a useful cue (e.g., Bel, Coll, & Resnik, 2010). Third, we noticed that many event nominal contexts contained semantically related words, like "birthday" for "party." Although all of these cues can also occur with object nominals, our preliminary corpus analyses of child-directed speech indicate that they are more common with event nominals. The potential utility of these cues was borne out by the data from Study 2; inspection of Figure 5 reveals that contexts containing at least one of these cues generally showed better performance than contexts with no cues.

4. Study 3: Can children use linguistic context to signal an event interpretation?

Given that adults are competent users of a large number of event nominals, their performance, though informative, only indirectly bears on the acquisition question. Therefore, in Study 3, we asked if children, too, would use cues available in the linguistic context to assign an unknown nominal an event interpretation rather than an object interpretation.

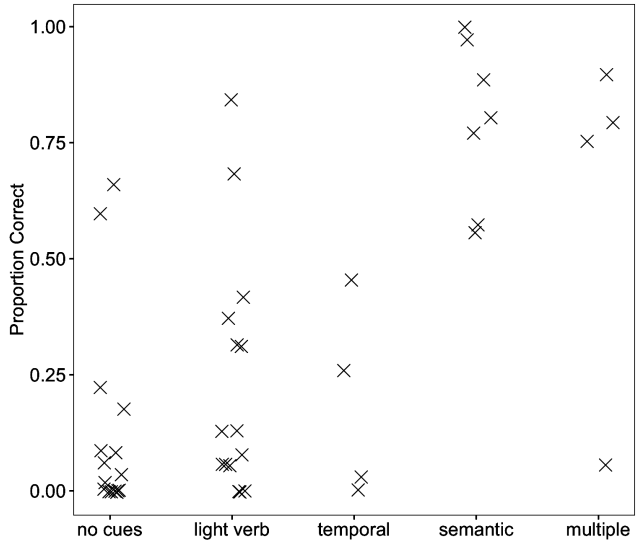

Fig 5. Accuracy data from Study 2, precise coding, event nominal trials only. Linguistic contexts are categorized by the potential cues they contain.

The object interpretation is expected to be the default, given the robust noun-object link that stems from early infancy (e.g., Waxman & Booth, 2001). However, Study 1 documented that preschoolers are able to assign an event interpretation to a nominal (despite having a non-adult like representation). What drives them to do so? Study 2 suggests that certain linguistic cues that signal eventivity may be helpful—in particular, the light verb cue and the temporal language cue. These cues, however, may be opaque to children—or at least, difficult to use. The light verb cue examined in Study 2 is a complex syntactic construction that emerges relatively late in production (Barner, 2001). Temporal expressions are themselves acquired late, through an extended slow mapping process (e.g., Shatz, Tare, Nguyen, & Young, 2010; Tillman & Barner, 2015; Tillman, Marghetis, Barner, & Srinivasan, 2017). These cues may not, therefore, be particularly useful for young learners in a word learning task. We test this directly in Study 3.

The third cue examined in Study 2 was the presence of labels for semantically-related objects. We omitted that cue from Study 3 because we wanted to create a very sparse learning situation requiring no background knowledge about what kinds of circumstances the event might take place in. Instead, we added a different third cue: ambicategoriality. Given that some event nominals can appear in both nominal and verbal form, a child hearing both "to kiss" and "a kiss" may be more likely to infer that the latter denotes an event than a child who only hears the nominal form. Ambicategoriality does not necessarily mean the nominal form will denote an event (consider for example the instrument meaning of "a hammer"). But in the absence of an obvious

instrument interpretation, we predicted that this cue would help children assign the nominal an event interpretation.

We adapted the clever dialogue paradigm developed by Yuan & Fisher, (2009), in which novel words are introduced in the context of a videotaped conversation between two actors. This allows us to provide a rich linguistic introduction to the novel word. In Experiment 3a, in the critical Event Nominal condition the dialogues included all three of the tested cues (light verb construction, temporal language, ambicategoriality). We contrasted this with a Control condition in which the novel word was presented with none of these cues (it occurred as the object of a variety of verbs varying in semantic heaviness, without temporal language, and only in nominal form). Next, to ensure that performance in Experiment 3a was not simply driven by ambicategoriality—making it a verb learning task—we presented the light verb and temporal cues separately, in Experiments 3b and 3c, respectively.

4.1. Participants

Children were recruited using the same inclusion criteria as in Study 1. In Experiment 3a, 40 children participated (20 per condition), and in each of Experiments 3b and 3c, 19 children participated (in only one condition). The age range was 2;7 to 5;5; mean age for Experiment 3a was 3;10, for Experiment 3b, 4;6, and for Experiment 3c, 4;1.

4.2. Method

The trial had the following three-part structure: Dialogue Phase, Familiarization Phase, Test Phase. See Figure 6. In the Dialogue Phase, the critical manipulation occurred. Children heard the novel nominal in several utterances. In the Event Nominal condition, it occurred with the three cues we expected to drive them to an event interpretation, while in the Control condition, it did not. It occurred the same number of times, in the same number of utterances, in both conditions. See Table 1. Next, in the Familiarization Phase, children viewed a novel character performing a novel action, labeled by the novel word. In the Event Nominal condition, the cues were repeated ("Look, there's gorping right now! He's doing a gorp!) and in the Control condition, the cues were absent ("Look, there's a gorp right there! There's a gorp!"). Finally, in the Test Phase, two scenes appeared side-by-side, one depicting the character performing a novel action, and the other depicting the character performing the now-familiar action. Children were asked to point to the referent of the novel word (e.g., "Do you see a gorp?"). Thus, an event interpretation of the nominal would lead to a "Same Event" choice, while an object nominal interpretation would lead to chance performance, because the character appears in both scenes.

4.3. Results and Discussion

Our results for Experiment 3a, depicted in Figure 7, indicate that children overwhelmingly select an event interpretation for the nominal (95%) when it appears in linguistic contexts with the three cues of light verbs, temporal language, and ambicategoriality. But without these cues, children were at chance (58%). A regression model including data from both conditions and children's age indicates a significant difference between conditions (condition $\beta = 0.36$, $t = 2.9$, $p < .01$) but no effect of age ($\beta = 0.0053$, $t = 0.78$, $p = .44$) and no condition x age interaction ($\beta = 0.011$, $t = 0.83$, $p = .41$).

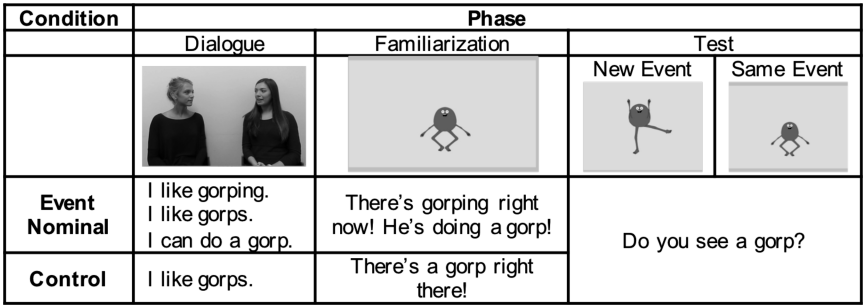

Fig 6. Schematic depiction of trial structure in Study 3.

Table 1. Auditory stimuli from Dialogue Phase in Study 3 Experiment 3a.

Event Nominal Condition	Control Condition
A: Hey! Annie likes to *gorp*! She really likes to do a *gorp.* **B:** Really? I can do a *gorp*. I like to *gorp* too! **A:** Oh! Annie *gorps* for 10 minutes. She likes *gorps*. **B:** I like *gorps* too. I only *gorp* for 5 minutes. **A:** Wow! Everybody likes *gorps*. I want to learn how to *gorp*! **B:** I can teach you how to *gorp*. **A:** Is it hard to do a *gorp*? **B:** It's easy to do a *gorp*. You should *gorp* for a few minutes every day. **A:** Great! I will *gorp* for 5 minutes every day! Now, can you show me a *gorp*? **B:** Sure! Let's see!	**A:** Hey! Annie likes *gorps*! She has a lot of *gorps*. **B:** Really? I have a *gorp*. I like *gorps* too! **A:** Oh! Annie has five *gorps*. Tell me about your *gorp*. **B:** I have a really good *gorp.* My *gorp* is great. **A:** Wow! Everybody likes *gorps*. I want a *gorp*! **B:** I can help you find *gorps*. **A:** Is it hard to find a *gorp*? **B:** It's easy to find a *gorp*. You should look for *gorps* everywhere. **A:** Great! I will look everywhere for *gorps*. Now, can you show me a *gorp*? **B:** Sure! Let's see!

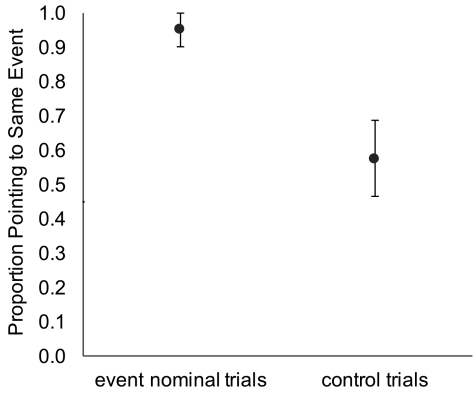

Fig 7. Results of Study 3 Experiment 3a.

In Experiments 3b and 3c, respectively, we tested temporal language and light verbs separately by modifying the dialogue to only include one cue. Each cue on its own also led to an event nominal interpretation at well above chance levels; light verbs yielded 100% correct performance, and temporal language yielded 71% correct performance.

Together, these findings suggest that certain linguistic cues help children map a novel noun to an event concept, rather than an object concept, overriding canonical links that they rely on in infancy (e.g., He & Lidz, 2017; Waxman & Booth, 2001). We are currently testing whether children will also succeed if at test they are required to extend the nominal to a new character—that is, the test phase depicts one scene in which the familiar character performs a new action, and another scene in which a new character performs the familiar action. This would reveal whether children initially represent the nominal as requiring specific event participants. Recall that in novel verb learning tasks, children sometimes seem to include specific objects in their initial representations of verbs, but that informative linguistic contexts can help them identify exemplars of the verb without those specific objects (e.g., Arunachalam & Waxman, 2011, 2015, Imai et al., 2008, 2005; Kersten & Smith, 2002; Syrett et al., 2014). In our ongoing work we hypothesize that linguistic contexts will also help fine-tune children's representations of event nominals in a similar way.

5. General Discussion

Our results indicate that while children appreciate links between objects and nominal forms, and events and verb forms, quite early in development, they are also able to appreciate other links. Although their representations for event nominals may be not quite correct, the way in which they seem to be incorrect is strikingly similar to the way in which verb representations in novel verb learning experiments are sometimes incorrect: they may require canonically associated objects to be present. Further, children use similar linguistic cues to the ones that adults seem to find helpful—light verb constructions, or the presence of

temporal expressions—despite that these cues may be harder to learn themselves than the argument structure cues typically used in verb learning.

In future work, we have four general directions planned beyond specific follow-ups on the studies discussed above. First, the children at the ages we tested already have several event nominals in their productive vocabularies. To understand what children's initial representations of event nominals look like for words with the complex referents probed in Study 1—such as *party*, which varies substantially from exemplar to exemplar and typically involves multiple event participants in complex relations to each other—as compared to the very simple events examined in Study 3, we will have to examine much younger children as they are beginning to build representations for these complex words. Second, we plan to use cross-situational learning paradigms to examine how children might recover from an initial hypothesis that an event nominal labeled an object, if the cues were not initially very constraining, to eventually assign it an event interpretation. Third, we plan to study whether event nominal acquisition follows the trajectory of verbs (as we have suggested here), or of other relational nouns (e.g., *sister*) (e.g., Gentner, 2005). Finally, for adults, different types of events yield different patterns of interpretation of event nominals (Barner, Wagner, & Snedeker, 2008), and it will be important to study varying kinds of events in acquisition as well.

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