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EARLY ACTION WORD LEARNING
HOW CHILDREN LEARN VERBS VERSUS NOUNS

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Abstract

While the literature on children's early and rapid word learning is plentiful, the literature pertaining specifically to verb learning is less so. The current study aimed to answer the question, "How can we better facilitate rapid verb learning?" Typically developing 3- to 5-year-old children participated in two sessions of instruction and outcome trials and a third session of testing and probe trials. Children were presented with an unfamiliar verb, "zoar" and asked to map this new word to an actor/action pair. Participants were divided into three groups, one of which received a low level prompt (zoar), another which received a mid level prompt (zoar-*ing)*, and the last which received a high level prompt (*This one is* zoaring). The children saw combinations of familiar and unfamiliar actor/action pairs on screen. In the probe stage, children were asked to extend the novel verb to the same action being performed by a new actor. Children in the first two groups (low and mid cues) struggled to correctly map the new word to the action rather than the actor. When given a full syntactic cue, as in group 3, however, most children mapped the new word to its correct action. It seems, then, that providing more complete morphological and syntactic cues allows children to overcome noun bias in their early word learning. Discussion regarding the implications of these findings follows.

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Introduction

Principles/Assumptions of Fast Mapping

Fast mapping refers to the rapid process by which young children rapidly expand their vocabulary early in life. Through a variety of different learning mechanisms or principles, beginning in the second year of life, children are able to learn new vocabulary at astonishing rates. Between 15 months and 6 years, children learn at least five to ten new words a day (based on Templin, 1957).

How do such small children, at the outset of development, accomplish this rapid learning? There are numerous assumptions, which constrain this rapid word learning to enable children to quickly and efficiently learn new words. Several of these assumptions bias lexical acquisition toward objects, or nouns. Since the majority of vocabulary to which children are exposed consists of nouns, it is important for children to have a mechanism to, in a way, fine-tune their learning toward these words. However, verbs and other parts of speech are also important for children to obtain in their lexicons.

As discussed later in this paper, verbs are qualitatively different from nouns in many ways and are acquired much slower and later than nouns in children's early vocabularies. For these reasons, verbs should be studied separately from nouns. Children's verb learning is made additionally challenging because of the "noun bias" with which children often approach vocabulary. In this paper, I will first discuss these principles that govern word learning in young children. I will then explore the differences between verbs and nouns that may contribute to the difficulties children face when learning new action words. Finally, I will explain how these two areas converge in relation to my research question.

Lexical contrast.

The principle of lexical contrast refers to the assumption that a novel word must differ in meaning from words the child has previously learned and knows (Golinkoff, et al., 1996; Behrend, 1990). Similarly, Disambiguation of Novel Word Meaning (Merriman & Bowman, 1989 in Wilkinson, 2005) claims that new words refer to unfamiliar, unnamed objects rather than to objects that have a label. Synonyms often refer to the same object, but children will reject multiple labels for the same referent based on this assumption. In order to learn synonyms, then, children have to learn some way to override this assumption. These lexical contrast assumptions include mutual exclusivity and novel name-nameless category (N3C).

Mutual exclusivity.

The first of these lexical contrast assumptions is mutual exclusivity. The principle of mutual exclusivity holds that a bias exists against allowing objects to have more than one name (Golinkoff, et al., 1996; Merriman, et al., 1993; Behrend, 1990; Markman, 1990). In other words, young children seem to be constrained to use only one label for each object; new words do not refer to already-labeled objects (Wilkinson, 2005). Based on this principle, when provided a set of three objects, of which two are known, children will tend to pair the novel label and the novel object out of hesitation to provide either known object with another name. According to Markman (1990), children follow a three-step process when a new label is presented. First, they look for an object as a first idea about the meaning. Second, they reject the known, already labeled object, and finally, they assume the remaining object is the referent for the novel word.

It is difficult for children to overcome the constraint that objects may only have one label. For example, a chair can only be a "chair." Young children have difficulty with superordinate (broader) terms, for example, in this case "furniture" and subordinate (narrower) terms, such as "recliner," (Behrend, 1990). When not provided a novel object to pair with the novel label, children may label a *part* of the familiar object as the novel word, but will not override this assumption to provide two names for the same referent.

Novel name-nameless category (N3C).

The novel name-nameless category also falls under lexical contrast assumptions. Novel name-nameless category (N3C) assumes that children will find an unnamed referent for a novel name or label. This principle functions on the assumption that children are automatically attracted to a novel object solely because of its novelty. For example, when given three objects, two of which are known, the child would tend to label the unknown object primarily because it is new. This differs from mutual exclusivity in that in N3C children do not label new objects through excluding all other options, but rather because the referent should refer to an unnamed object (Wilkinson, 2005). N3C and Mutual Exclusivity ultimately result in the same behavior – the child pairing a novel word with an unfamiliar object – but differ theoretically in how children arrive at that conclusion. Wilkinson (2005) proposes that the two competing theories may be working in conjunction and that children may use both or alternate between the two when learning new words.

Taxonomic assumption/categorical scope.

While the previously mentioned principles relate to all word learning, the next few described are biased toward nouns/objects, and therefore constrain verb learning.

The nature of these assumptions, which include whole-object bias and noun-category bias, lead the child to likely assume a novel label refers to a noun, rather than other parts of speech, like verbs. One of these principles is the taxonomic assumption or categorical scope. This principle holds that children will extend newly learned names to other exemplars in the same basic level category, and not by thematic relationships (Markman, 1990; Golinkoff, et al., 1996). For example, children are more likely to extend the word "dog" to a cat, which is another exemplar of "animal" and not to bone, which is thematically linked to "dog."

Whole-object bias/object scope.

The whole-object bias refers to the concept that a new *noun* refers to an entire object, rather than to one of its parts (Behrend, 1990). Object scope operates under two assumptions; First, words label objects, and second, words refer to the whole object (Golinkoff, Hirsh-Pasek, Bailey & Wenger, 1992). In using this principle, for example, a child learning a new label of "cat" would assume the label refers to the whole animal being described, not specifically the tail, or the whiskers, or the texture of the fur. Merriman and colleagues (1996) describe a similar concept, the Object Kind principle. They argue that when children hear a sentence type, such as "There's a _____ over there," they know the slot is filled by an object name. Based on syntactic bootstrapping, children will assume the novel word in the sentence refers to an object.

Noun-category bias.

Children also learn new words within the constraints of the noun-category bias. Children assume that a novel label must refer to an object or noun rather than other parts

of speech such as verbs or adjectives. This constraint contributes to the difficulty that children face when learning words from other grammatical categories.

Quick incidental learning.

Rice (1990, 1991, in Oetting & Rice, 1995) proposes an additional theory to explain how children learn new words, even with minimal explicit instruction. Quick Incidental Learning (QUIL), defined by Rice (1990, 1991, in Oetting & Rice, 1995), refers to children's ability to learn at least partial meaning of new words in contexts that lack reference or prompting from adults, such as video watching. QUIL, then, serves as an alternative means to expose children to new vocabulary, where these aforementioned assumptions may be operating. QUIL builds on the principle of fast mapping by emphasizing the seeming incidental nature of word learning (Oetting & Rice, 1995).

Verb Characteristics

Research has shown that verbs differ from nouns in many ways. Verbs enter children's vocabulary slower and developmentally later than nouns. Typically, children begin to exhibit action words in their expressive vocabulary by 21 months (Bloom & Lahey in Golinkoff, et al., 1996), and receptively by 16 months (Golinkoff, et al. 1987 in Golinkoff, et. al., 1996). Behrend (1990) found that one-year-olds are more likely to learn object labels than action labels when equally exposed to both. Additionally, verbs tend to be learned and extended later than nouns across many different languages, even "verb-friendly" languages, such as Japanese, Chinese and Korean (Imai, et al., 2008). So, what is it about verbs that makes them more difficult to learn?

Golinkoff's five reasons.

Golinkoff and colleagues (1996) identified five reasons that action labels tend to be more difficult to map than objects. First, to map verbs requires children to uncover the semantic components of the verb, such as direction, location or manner of the action (Behrend, 1990). Second, actions tend to be more abstract than objects, which are, by nature, concrete. In other words, one can easily perceive objects as they are stable or permanent, while actions are often brief and transient. Third, it is much more difficult to identify constancy among actions than among objects. In other words, is "eating" still eating regardless if a person or their pet dog is performing the action? Fourth, several verbs can be used to describe many similar actions. For example, there is a vague line between "running" and "jogging." At what point does jogging become running, or sprinting? Fifth, to successfully learn a verb, the child must master the associated argument structure. That is, does the verb require an object, or can it be present in isolation?

Linguistic differences.

Black and Chiat (2002) argue that verbs differ from nouns phonologically, conceptual-semantically, and syntactically. Verbs differ phonologically from nouns by stress pattern, duration (verbs are generally shorter in duration than nouns) and syllable number (nouns tend to have more syllables) (Black & Chiat, 2002). Semantically, verbs differ from nouns in several ways. In English, for example, a single verb, "put," can be used in many different contexts based on "tightness of fit" (i.e. to *put* a cassette into a case, to *put* an apple in a bowl, to *put* a cup on the table and to *put* a lid on a container). Conversely, in Korean, these actions require three separate verbs (Black & Chiat, 2002). Another semantic difference comes from the perspective of the actor performing the

action. For example, dyads, such as pour and fill, give and take, and buy and sell, refer to the same action being performed, but differ based on whose perspective is being taken (Black & Chiat, 2002). Similarly, the sentences "John *gives* the book to Mary" and "Mary *gets* the book from John" refer to the same event, but from differing perspectives (Gleitman & Gleitman, 1992). These subtle complexities in verbs may explain, in part, why children's learning of action words seems more difficult than mapping of nouns.

Different types of verbs (action, instrument, result).

Behrend (1990) defines several classifications of verbs. Action verbs explicitly label the movement of the action. Examples include "squeeze" or "pound." Result verbs, however, label the change of state that results from a movement, such as "break" or "flatten" (Behrend, 1990). Behrend (1987) and Bloom, et al. (1975) found that children more often use action verbs than result verbs (in Behrend, 1990). Similarly, Huttenlocher et al. (1983; in Behrend, 1990) found that young children between the ages of 20 and 42 months comprehended action verbs prior to result, or change, verbs. Behrend (1990) found that 5- and 7-year-old children used an equal number of action and result verbs, while 3-year-olds used slightly more action verbs than result verbs and adults used more result verbs than action verbs. This indicates that children use action verbs at younger ages and gradually increase their use of result verbs.

Behrend (1990) further identified another type of verb: instrument verbs. Instrument verbs label tools, or instruments, used by an agent during a movement. Often, these are evident in children's lexical innovations – words, often invented, that fill gaps in children's vocabularies. A common type of innovation is known as an instrumental denominal verb (Behrend, 1990). Children basically convert labels for

known objects into verbs. For example, a child may say "I *broom*ed it" or "He *knife*d the food." These fabricated words, while not correct, are successful in conveying the child's message, and are easily comprehended by other children (Bushnell & Maratsos, 1984 in Behrend, 1990). Behrend (1990) found that instrument verbs were used less frequently than the other types, but were more likely to occur as a first response, perhaps because they carry more information in their meanings and are, therefore, more efficient labels.

Event components.

Golinkoff and Hirsh-Pasek (2008) claim that children may find learning verbs challenging in part because they have difficulty identifying components of the events in which actions occur. They identified several components of events: containment and support, path and manner, and source and goal. Containment refers to the concept of 'in.' That is, when an object is *in* "any fully or partially enclosed space." Support refers to 'on,' which occurs when an object is supported by another ground object. Infants are able to categorize containment by six months of age, with support categories appearing later at around 14 months.

Path refers to the actual movement of a figure with respect to another ground object. Manner refers to *how* the figure moves within an event. Path relations are relatively easier to detect and categorize than manner. Path and manner relations are found in every language, but in different proportions. Some languages, such as Spanish, use more path verbs than manner. For example, a Spanish speaker may say "The woman exited the house," implying *running* as the manner. Conversely, English uses more

manner verbs than path. For example, an English speaker may say, "The woman ran out of the house," with the *exit* path implied (Golinkoff & Hirsh-Pasek, 2008).

The source of the event identifies from where the path begins. The goal is the endpoint, or to where the path leads. Goal paths are expressed more often than source paths. By 14 months, children form categories of goals, but not of sources.

Neurological differences.

Recent research indicates that there are more than just characteristic differences between nouns and verbs – that our brains are physically wired to learn nouns and verbs differently. Mestres-Misse, Rodriguez-Fornells and Muente (2009) found significant differences in where nouns and verbs are stored in the brain. They discovered that nouns are stored in the Left Fusiform Gyrus (Brodmann's area 20) and the Parahippocampal gyrus (Brodmann's area 36). Verbs, however, are stored in the Left Middle/Superior posterior temporal gyrus (Brodmann's areas 21 and 22) and the Left Interior Frontal gyrus (Brodmann's area 44). These results indicate that there is an obvious neurological basis which accounts for some of the differences between verbs and nouns.

Assumptions as they relate to verbs.

Merriman, et al. (1993) found some evidence that some aspects of the assumptions described above may loosely relate to verbs as well as nouns, while others clearly do not. For example, children do tend to map unfamiliar verb labels to novel actions, but this is significantly weaker than for nouns. However, there is no "whole action" principle as there is for nouns. Mutual exclusivity does seem to relate to verbs, as well as nouns. Only when two action phrases refer to the same action performed by the

same agent are they in violation of mutual exclusivity (Merriman, et al., 1996). Even considering the carryover of some of these principles to verbs, overcoming noun bias is quite difficult.

Word-world mapping.

When children learn names for novel objects, they act under a word-world correspondence (Gleitman & Gleitman, 1992). This same relationship however may not correctly explain the process of verb mapping. One issue is that caretakers may not label events as they occur. For example, a parent may show a child an open container for the verb "open," rather than showing the act of opening the container. Likewise, when someone opens the front door, he or she does not say, "I'm *opening* the door," but rather "Hello" or a similar comment. Therefore, in any situation, the novel verb could potentially refer to many aspects. Gleitman and Gleitman (1992) proposed an alternate theory, sentence-world, to account for these problems. They claimed that children take advantage of syntactic clues to focus on the aspect of the scene to which the novel word refers.

Extension of novel verbs.

A test of how successfully a new word has been mapped is in how well the child can generalize the meaning to other situations. Waxman and colleagues (2009) claim that in order for verbs to be extended, children must understand that the word can apply to other similar events even if they are performed by other actors, in other situations. Young children appear to succeed in verb learning when the same actors and objects are present, but tend to experience difficulty when the participants change. (Waxman, et al., 2009).

The authors argue that young learners are "captured" by the actors and instruments, rather than the action itself.

Emergentist coalition model.

The Emergentist Coalition Model, a hybid approach, theorizes that children require multiple cues to map any words – nouns or verbs – to a referent (Golinkoff & Hirsh-Pasek, 2008). Brandone and others (2007) propose that there are two possible solutions to overcome difficulty in learning verbs. The first solution is related to action salience. Children are likely to assume novel words refer to the most perceptually salient action in their environment. Naigles and Kako (1993) in Brandone, et al., 2007) found a hierarchy in children's action mapping preferences based on perceptual salience. Children prefer to map a new word to synchronous actions, in which both actors move simultaneously. Next, children tend to map novel words to causative actions, in which one character forces another to move. Finally, children may map new words to contact actions, in which one actor touches the other. Following this solution alone assumes that children will only learn verbs that are salient in their environments, which is not the case. The second proposed solution fills this gap and explains why children still learn verbs that lack perceptual salience. This second solution suggests that children rely on linguistic and social information from the speaker to learn new action words (Brandone, et al., 2007). Through syntactic bootstrapping and pragmatic cues, such as the speaker's attentional focus and communicative intent, children can refocus their own attention to overcome salience preference.

Additionally, Johnson and de Villiers (2009) claimed that several types of clues exist that allow children to identify the word as a verb, rather than a noun or other part of

speech. They identified morphological clues, such as word endings like past tense (*–ed)*, present progressive (*-ing*) and third person singular (*-s*), and syntactic clues. Syntactic structure clues included: intratransitive forms, which in addition to a verb only include a subject; transitive forms, which include both a subject and an object; and dative forms, which contain a subject, an object and an indirect object (Johnson & de Villiers, 2009). Johnson and de Villiers argue that these morphological and syntactic clues allow children to correctly identify the new word as a verb.

Children rely on these perceptual cues, the social intent of the speaker and linguistic cues to pinpoint the true referent. Verb mapping may be more difficult for young children for several reasons, according to Golinkoff and Hirsh-Pasek (2008). First, verbs are relational; that is, the actors and objects related to the action often are more salient, or interesting, than the action itself. Second, many verbs are perceptually ambiguous and changes in meaning between verbs are often unclear shades of gray. Additionally, actions performed by unknown actors may interfere with the mapping of the object, as the child may be drawn to the unknown actor rather than the action he is performing. Because of these reasons, children may require additional support, known as syntactic bootstrapping – or the use of number and arrangement of arguments in the sentence to compute meaning – to successfully map action words. Eyer and others (2002) similarly suggested that verbs may not be learned through simple exposure, but likely require syntactic frames to assist action word mapping.

Research Question

As the prior research demonstrates, children's learning of vocabulary seems "stacked" against action words in favor of nouns. This study aimed to answer the

question: What is the role of syntactic cues in helping children overcome these aforementioned assumptions? Several studies answer the question: How do verbs differ from nouns? Few, however, have explored how we can better facilitate children's learning of verbs. McDuffie and colleagues (2007), in their comparative study of adolescents with Down syndrome and young typically developing children, found that both groups failed to map novel words to novel actions. They argued that it may be too much to expect children to map a novel word and a novel action, and form the association between them. The aim of this present study is to explore what supports are needed in order to enable children to do so.

Methods

Subjects

Fifty 3- to 5-year olds were recruited for this study. Of the fifty recruited participants, twelve did not enter the study. Ten children were removed from analysis, as their PPVT scores were too low. Presumably, children whose language skills fell far below their chronological age would have been unlikely to successfully complete the tasks. Additionally, two children were excluded, as they were significantly older than other children in the study. Of the thirty-eight remaining participants, three children were also removed from analysis due to procedural problems.

The experiment called for three groups differing by the cue presented to each; thus, the children were divided into three groups; one received a low cue, one received a mid-cue, and the last received a high cue. The final groups included: low cue (n=11; mean CA=52 mos; mean PPVT = 54.8 mos), mid-cue (n=12; mean CA=51 mos; mean PPVT = 62.4 mos), and high cue (n=12; mean CA=50 mos; mean PPVT = 59.2mos).

Materials

Children used a computer with programmed software to complete the tasks. They used a computer mouse to select images on the screen.

As mentioned above, children were placed in three groups differing in cues provided to them. Children in the first group received a low cue, in this case the base form of the novel verb. For example, these children only heard "zoar" or "cheth," and were subsequently asked to select the clip corresponding to these labels. Children in the second group received a mid-cue, hearing the present participle of the novel word. These children heard "zoar-*ing*" and "cheth-*ing*," and were asked again to select the clip that

had been labeled. The final group received a high cue, with full syntactic structure. Children in this group heard "*This one is* zoar*ing*" and "*This one is* cheth*ing*."

Procedures

Children in all three groups underwent the same general method. The children were shown three clips of animals (actors) performing actions, playing simultaneously. The child heard a label, and was asked to choose the clip to which he or she thought the label was referring. For some trials, the child heard familiar labels, such as "play," or "scratch," being performed by familiar actors, such as "cat" and "dog." For others, the child heard a novel label, in this case, "zoar" or "cheth." These novel actions were performed by unknown animals, "llama" and "hermit crab." Familiar and unfamiliar agent-action pairs are shown in Figure 1.

For each session in each group, children were reinforced on a variable rate schedule of four. The videos were presented and the locations of each response were recorded using software developed for this purpose (Dube, 1991 in Wilkinson, 2005) in a layout shown in Figure 2. The center square remained empty while videos filled three of the four remaining boxes.

Each group received two sessions of instruction, conducted 1-3 days apart. The first session included 25 exclusion trials to determine if children could learn the new actor-action labels. The second instruction session included 26 exclusion trials followed by immediate initial outcome testing, which included 13 trials. In each of these sessions, the child viewed 6 trials including the llama "zoaring" (a yawning action), and 6 trials of the hermit crab "chething" (a side-crawling action). These trials also combined

"baseline" trials of well-known animals performing familiar actions with the novel ones. This is shown in Figure 3.

After the two instruction trials, children underwent a third and final session completed three days later, which served as a test for learning. The first part of this session included 16 delayed outcome testing trials to determine if the child remembered which word corresponded with each clip. During the testing trials, both unfamiliar clips were presented together, as seen in Figure 4, and the child was asked to differentiate them based on the label provided. Three testing trials were provided for each novel word.

Finally, a probe was presented at the conclusion of the final session. Six probe trials were presented, four of which required children to differentiate between the actor and the action. Children were shown a clip of a llama. In the probe, however, the llama was walking: the original actor performing a different action. This is shown in Figure 5. Children were also shown a clip of an eel yawning: a different actor performing the same action. This probe was designed to test whether children had mapped the novel label to the actor or to the action. Children who, at this stage, selected the llama after the novel word was heard had mapped the label to the actor, the llama. Children who selected the eel had correctly mapped the novel action label to the action.

Results

In the outcome, or testing, trials, most children scored at or above 88% correct in selecting the clip corresponding to the label provided. In other words, these children had correctly mapped the novel labels "zoar" and "cheth" to the llama yawn-gulping and the crab side-crawling, respectively. Those children who scored below this level of 88% were removed from further analysis. If they had not successfully learned which label corresponded to the appropriate clip at this level, how could they be expected to extend the same label to a new actor? In total, 7 children were excluded for scoring at or below 75 percent on the outcome trials: two in group one, three in group two and two in group three.

Results By Group

Group one

Of the children in Group 1 (the group that heard only the root verb, "zoar"), only one mapped the novel verb to the correct action with 100 percent accuracy. In other words, only one child correctly extended the novel verb, "zoar," to the action of the eel gulping, not the llama walking. Two additional children did so with 75 percent accuracy. The remaining six children consistently mapped the verb to the actor and not the action. That is, they incorrectly extended the novel verb, "zoar," to the llama and not the action of yawn-gulping.

Group two

In Group 2, in which the children heard the present progressive form, "zoar*ing*", only three of the children mapped the novel verb to the correct action with 100 percent accuracy. One scored 75 percent in the probe, correctly mapping the action label to the

action. The remaining five children in Group 2 only mapped to the correct action at below chance levels (at 25% or below). Rather, these children mapped to the actor and not the action.

Group three

In Group 3, in which the children heard the full syntactic cue of "This one is zoaring," seven children correctly mapped the novel verb to the action with 100 percent accuracy. The three remaining children scored below chance levels on this probe, mapping the novel verb to the actor rather than the action. In other words, these children had mapped the verb "zoar" to the actor (the llama) and not the intended action (yawn-gulping). Perhaps even more impressive, all of the children in Group 3 who did correctly map to the action did so with 100 percent accuracy. The differences in correct and incorrect responses between the three groups are shown in Figures 6 and 7.

Chi Square Analysis

A chi square analysis was completed to determine the statistical significance of the data. In order to fulfill the requirements of chi square analysis, the data were condensed into two groups: those children who had scored 100% (correctly mapping the label to the action each time) and those who had not (any scores 75% and below). This is shown in Table 1, and graphically in Figure 8.

After completing the analysis, the chi-square was determined to be 7.084, significant at $p = .05$ for two degrees of freedom. This indicates that the collected data were statistically significant and that the results are not due to confounding variables.

Further Analysis

I chose additionally to further separate the subjects' performances into three groups, as shown in Figure 9. The first group of children (shown in blue) correctly mapped the novel action label to the action with 100% accuracy. The second group (shown in red) seemed confused by the task, scoring 50 – 75%, higher than chance levels but not with certainty. The third group (shown in green) scored at or below chance levels (25% and lower). The correct responses in this case cannot be differentiated from the likelihood of correctly choosing one out of four simply from chance.

This graph clearly indicates that the number of children mapping with 100% accuracy drastically increases between condition two and three (the mid- and high-level cues). Conversely, the number of children scoring at or below chance drastically decreases. Further, the number of children who seem confused by the task (those scoring 50-75%) decreases with increasing syntactic complexity.

Bilingual Children

The sample included a few children who were either bilingual or native Chinese speakers. Considering the differences in development experienced by bilingual children and English language learners, we wondered if there would be any change in the data when these children were removed from analysis. When bilingual children were excluded, the number of correct mappings of novel verb to action between Groups 2 and 3 shifted. As seen in Figure 10, although there was not a large change, the incline marking the change between Groups 2 and 3 steepened.

Discussion

Overcoming Noun Bias

These results suggest that children perform better on this task when provided with syntactic cues. The first group, which received a low level cue, primarily mapped the novel verb presented to the actor rather than the action to which it was referring. With no morpho-syntactic supports, the children, as a whole, did not overcome noun biases to map the word to the action. Children who received a mid level cue (Group 2) performed better than those in Group 1, but the majority still failed to correctly map the new verb label to the correct action. Conversely, in Group 3, which received a full syntactic cue, the majority of subjects correctly mapped the novel verb to the correct action. It seems that syntactic cues, such as this, help children overcome their biases toward nouns in early language learning to acquire new verbs.The first two syntactic cues provided in the low- and mid-level prompts were relatively ineffective in facilitating the correct mapping of the novel label to the action being performed. Children required a full, rather than partial, syntactic structure as provided in the high-level prompt to accurately map the novel word to the action and not the actor.

As noted in the introduction, mutual exclusivity posits that young children hesitate to assign a new label to a known referent. This constraint theoretically leads young children to pair novel labels and referents to learn new words. In the present study, children were not pretested for their knowledge of llama, the presumed unknown actor used in the study. It is possible, then, that children may have actually been familiar with “llama. In the first two conditions, low- and mid-cue, the majority of children mapped the novel label to the llama and not the action. If these children were indeed

familiar with the concept of llama, it indicates a contradiction to the principle of mutual exclusivity. In other words, children may have been more comfortable providing a second label to a known referent than mapping an action before its performing actor. In other words, this indicates that "noun bias" is so strong that children may prefer to violate other assumptions, such as mutual exclusivity, rather than overcoming this bias.

Syntactic Bootstrapping

Additionally noted in the introduction is the concept of syntactic bootstrapping, or the use of the arrangement and number of arguments in a sentence to determine meaning. Sentence structures, and the rules governing syntax, allow young children to determine not only the type of any given word (noun, verb, etc.) but also provide helpful clues to the meaning of the word. In the present study, participants who heard a full syntactic cue ("This one is zoaring") outperformed their peers who heard only a single word stimulus ("zoar" or "zoaring"). This indicates that morphological markers alone may not be adequate for young children to determine a novel word refers to an action and not an object. Rather, when participants were able to rely on syntactic structure, they were more likely to correctly complete the task. Thus, syntactic bootstrapping may be a significant source of assistance to young children learning verbs.

Implications for Practice

The results of the present study indicate that only when full syntactic structure is provided do typically developing 3- to 5-year olds overcome "noun bias" to learn novel action words. This implies that, when working with early language learners, it may be beneficial to provide more complete syntactic cues to facilitate verb learning. Most children acquire action words in their lexicon, albeit at slower rates and later ages.

Helping with this learning may ease frustration children experience when they struggle to learn new words. Still, children struggling with language, and specifically the use of verbs, may benefit greatly from the use of complete syntactic structures. Further, as noted in the results, use of full syntactic structure may decrease confusion surrounding the task. In the first two groups of low- and mid-level prompts, a portion of children experienced confusion with the task. Conversely, in Group 3, when a high-level prompt was provided, no children experienced confusion. It seems, then, that using complete syntactic structure can help facilitate verb learning for all children.

Limitations

One limitation of the present study was the small sample size. While the results were determined to be statistically significant, it would certainly be beneficial to replicate the study with more participants. An additional limitation was the absence of pretesting children prior to conducting the study. It is unknown whether llama and hermit crab were indeed novel animals for the children, or if they were familiar.

Directions for Future Research

If the present or similar study were to be replicated, a few improvements could be considered. First, it would be advantageous to reproduce the study with more participants to strengthen the results. Additionally, pretesting the children for their knowledge of the actors and actions used would be valuable. Ideally, the study should be done using a completely novel actor-action dyad, to ensure true exclusion is occurring. Finally, this study was performed with typically developing children only. It would be of interest to determine if these results are similar across other populations, including children with language disorders or delays and other developmental disabilities.

Tables and Figures

Table 1

	Low Cue	Mid Cue	High Cue	Row total
Chose 4/4	1	3	7	11
Chose 0-3/4	8	6	3	17
Column total	9	9	10	28

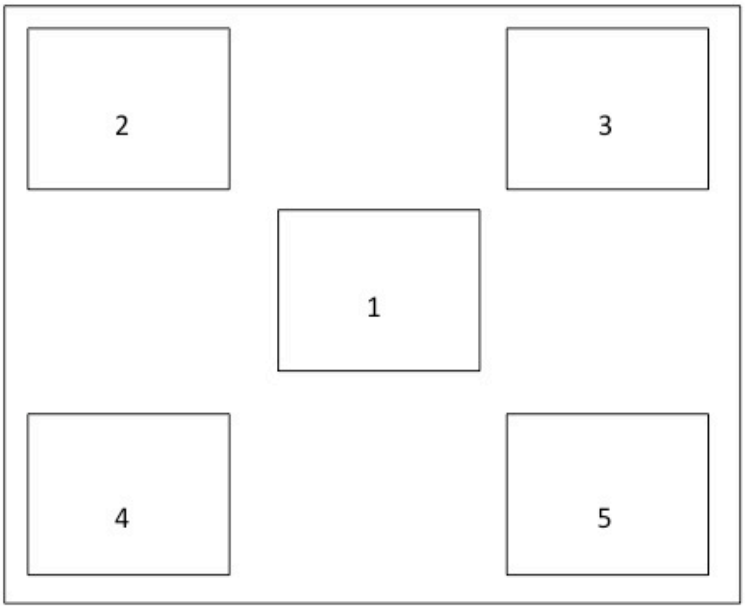
This is the table used to complete the chi square analysis. It divides the participants into the three groups to which they were assigned (low, mid, and high cue) and further separates them into two groups based on their performance on the probe.

Figure 1

Known actors performing known actions (Left: Cat *scratching*. Right: Dog *playing*)

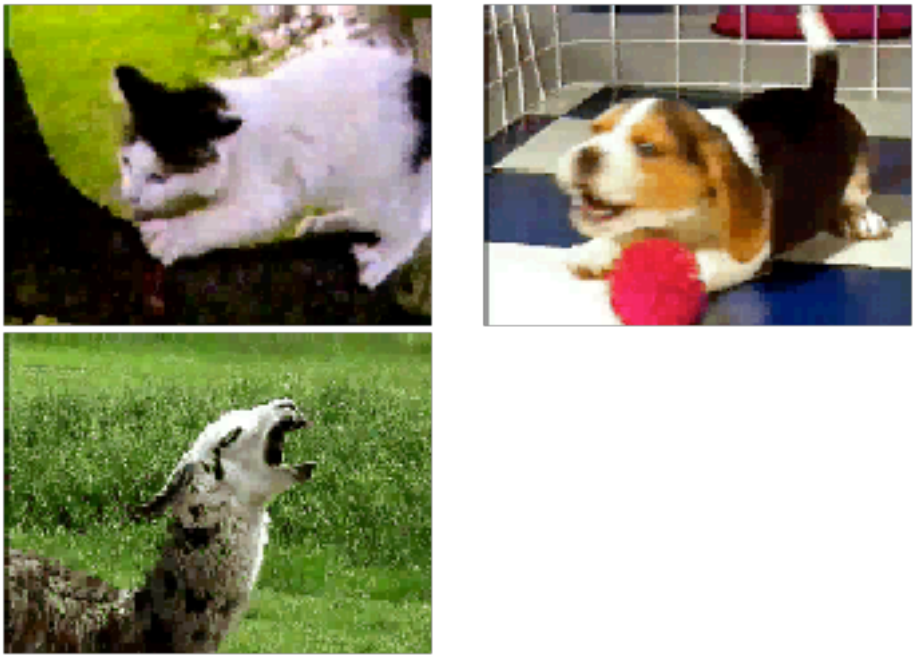
Unknown actors performing novel actions (Left: Llama *zoaring*. Right: Crab *chething*.)

Figure 2



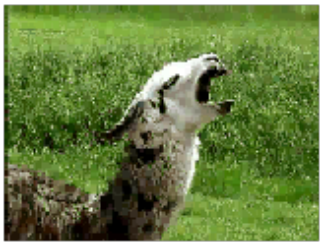
This figure shows the layout of the screen the participants saw in their sessions. Square 1 was left empty with three of the remaining four squares containing moving images of the actor/action pairs.

Figure 3



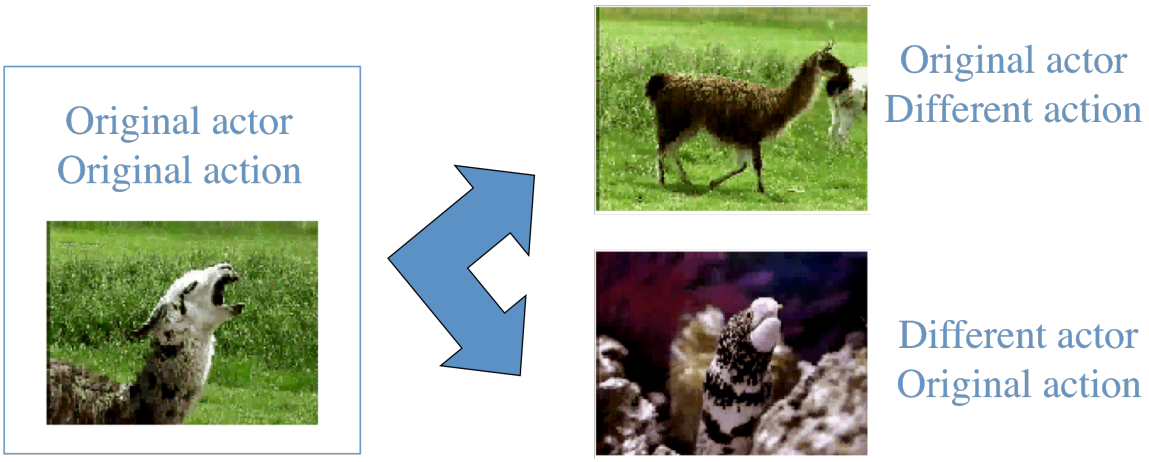
Screen image that children saw during instruction sessions: The novel actor/action (the llama *zoaring*) is combined with familiar actor/action pairs.

Figure 4



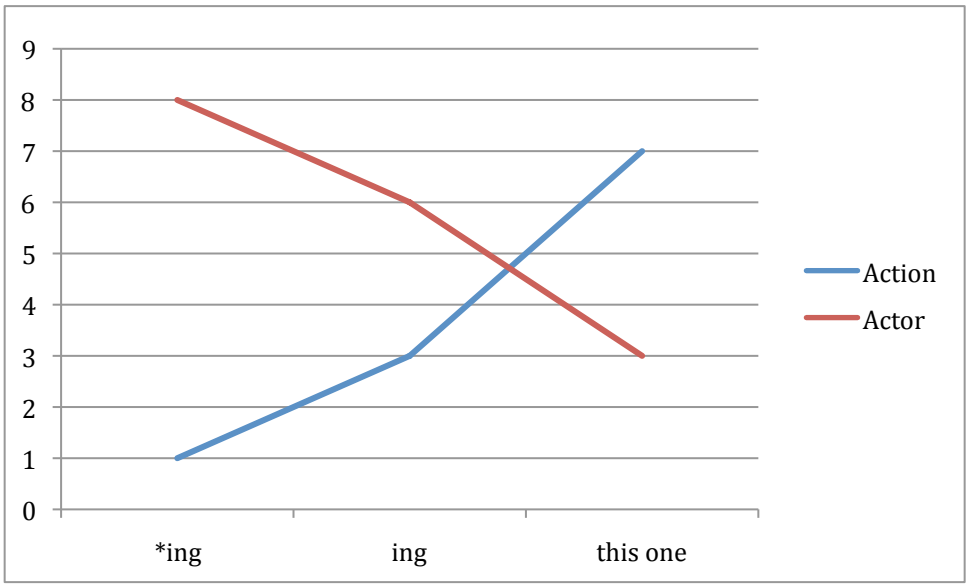
Screen image children saw during testing trials. This session tested to see if children had mapped the novel label to the correct actor/action pair.

Figure 5



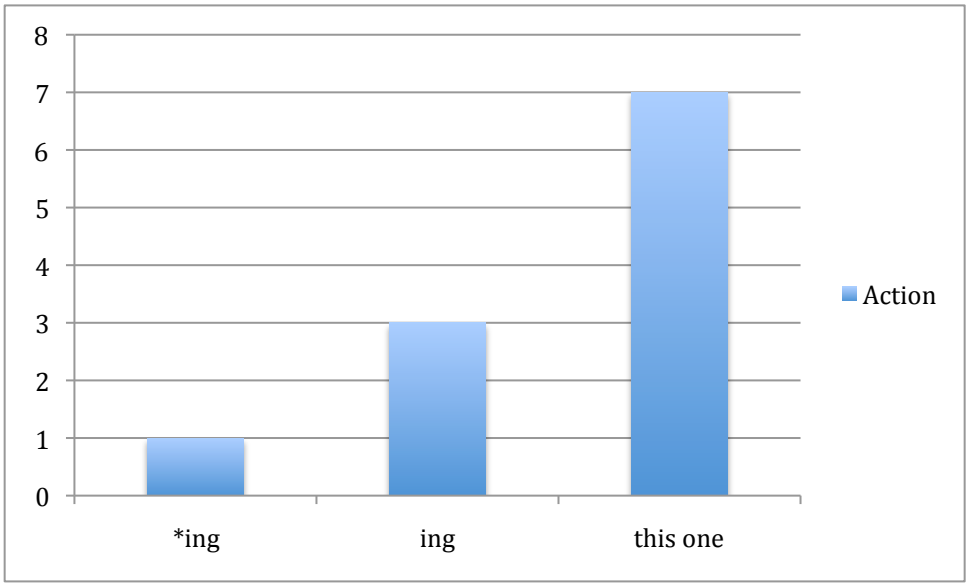
The probe assessed whether children had mapped the novel label to the action or to the actor. Children who chose the llama had mapped the new word to the actor, while children who selected the eel had correctly mapped the new word to the action.

Figure 6



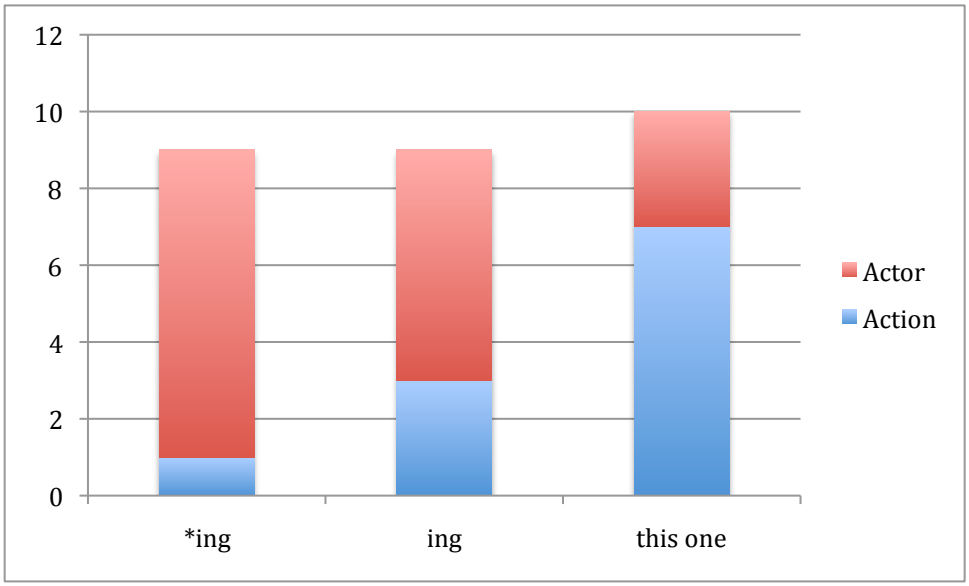
Including children who selected the action with 100% accuracy, this graph compares children who correctly mapped to the action and those who mapped the novel verb to the actor.

Figure 7



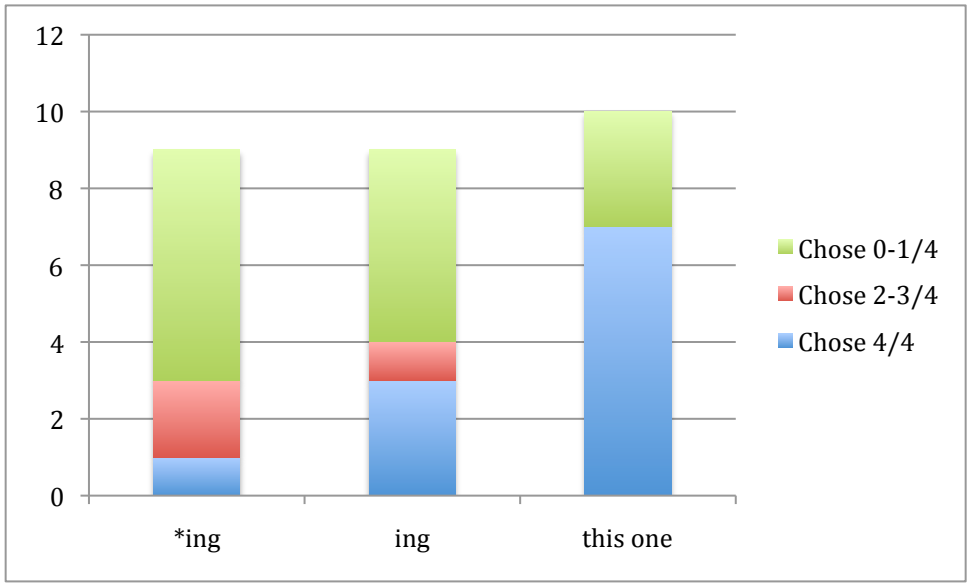
This graph looks at the number of children who mapped to the action correctly across groups. It only includes children who did so with 100% accuracy.

Figure 8



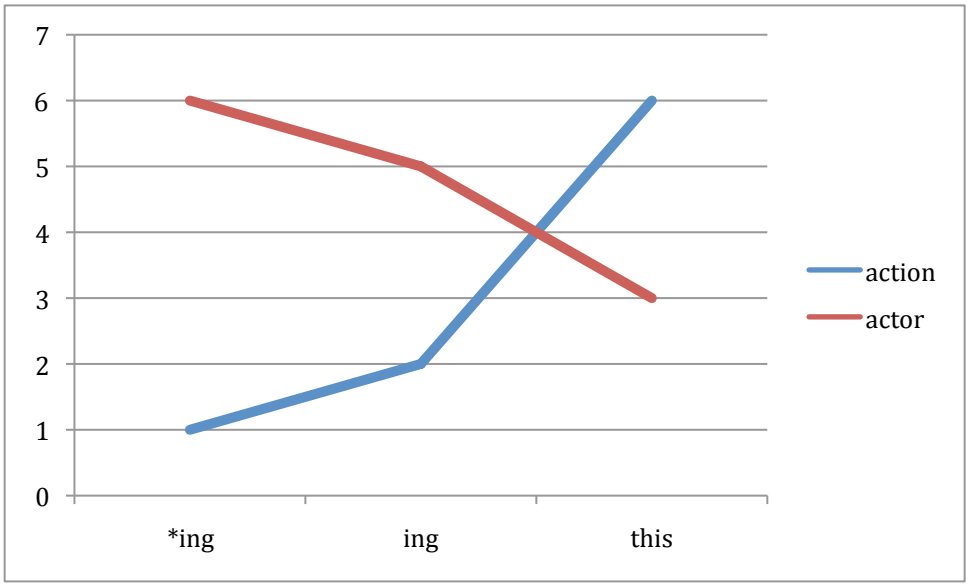
This graph looks at the number of children who mapped to the action compared to those who chose the actor across groups. The distinction was made by looking only at children who mapped to the action with 100% accuracy compared to those who did not.

Figure 9



This graph shows the number of children who mapped the novel word to the action with 100% accuracy (shown in blue), the number of children who mapped the novel word to the actor consistently (shown in green) and the number of children who seemed confused by the task (shown in red).

Figure 10



This graph shows the change in trend between groups when bilingual children and English language learners were removed from analysis.

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