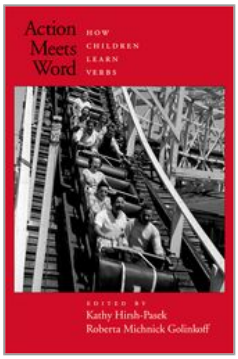

Action Meets Word: How children learn verbs
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Are Nouns Easier to Learn Than Verbs? Three Experimental Studies

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Abstract and Keywords

A current controversy in the study of word learning is whether it is conceptually easier to learn nouns as compared to verbs early in development. This chapter describes three experiments which address the noun-verb question in different ways. In the first experiment, researchers asked how many times (and on how many days) does a 2-year-old need to hear a word to be able to learn it, and does this differ for nouns and verbs? This second study investigates whether — when nouns and verbs are presented in comparable sentence contexts, controlling the number of exposures, and presenting a dynamic event in both the noun and verb conditions — nouns are easier to learn than are verbs. In Study 3, researchers compared children's ability to learn intransitive and transitive verbs and their ability to understand verbs for self-action as opposed to other action, to determine whether some of these

verb and referent types are learned more quickly than are others.

Keywords: nouns, word learning, verbs

A current controversy in the study of word learning is whether it is conceptually easier to learn nouns as compared to verbs early in development. Using data available at the time, Gentner (1982) showed that across several languages, children's early productive vocabularies appear to be dominated by nouns. From this evidence, she argued that it may be easier for infants to acquire nouns because the referents of nouns are more easily “packaged” than are the referents for verbs. That is, in a simplified view of word learning, the child must attend to appropriate perceptual elements, package them together, and connect them in some way to a spoken word. Perceptual elements that are often referred to by nouns (e.g., concrete objects), tend to be highly cohesive (doggie “parts” are always seen when a dog is present, for example), are viewed across language and culture in the same way (i.e., as objects), and are referred to using the same word type (i.e., nouns). In contrast, the perceptual elements that are connected to individual verbs are not as cohesive because elements of meaning are likely to be distributed across time and space, they are not conceptualized in the same way across languages and cultures (i.e., languages vary in the way verbs refer to different aspects of events), and they may not be universally lexicalized as verbs (e.g., the verb category itself varies across languages).

More recently, Gentner and Boroditsky (2001) have expanded on these ideas by reiterating that they are not proposing that “nouns are easy.” They are proposing that, if children are able to conceive of a referent in itself, outside of or before language, it should be easier for the infant to then learn how to refer to that referent using language than it will be to both package the world and learn a new word at the same time. Some nouns, particularly names for concrete objects, are likely to be “preindividuated,” or likely to have become concepts or categories, before the word for those concepts is learned. If they are preindividuated and if that (p.312) coherency in the referent does help word learning, then early

vocabularies should have just those types of words. Note that this view is not a “noun first” view; it predicts that any word type that refers to concepts that an infant can easily conceptualize, individuate, or parse will appear earlier in development. Tomasello (2003) added further that some kinds of joint attentional frames and linguistic utterances make the referents of some words particularly transparent for young children, and many of these have to do with the manipulation, exchange, and labeling of objects—the fact that objects are to some degree preindividuated conceptually is an important part of this process.

In recent investigations of Gentner's proposals, researchers have examined children's productive vocabularies across languages. This body of research suggests that, in general, the early productive vocabularies of children learning English, Italian, or Spanish favor nouns (Au, Dapretto, & Song, 1994; Jackson-Maldonado, Thal, Marchman, Bates, & Gutierrez-Clellen, 1993; Tardif, Gelman, & Xu, 1999; Tardif, Shatz, & Naigles, 1997), while children acquiring Mandarin (Tardif et al., 1997, 1999) and perhaps Korean (Gopnik & Choi, 1995; but see also Au et al., 1994; Kim, McGregor, & Thompson, 2000) do not, possibly because nouns are not favored in the input in these languages. A methodological problem inherent in this type of study is that because children use each of their verbs more frequently than they use each of their nouns, spontaneous speech samples tend to underestimate children's noun vocabularies because, relative to individual verbs, the probability that a child will use any particular noun in one hour of sampling is not very high. This has led some researchers to prefer the use of a vocabulary checklist to estimate noun and verb comprehension and production (Caselli, Casadio, & Bates, 1999). For this reason, Tardif et al. (1999) measured Mandarin-speaking children's vocabularies in two ways (spontaneous sample and vocabulary checklist), and the verb advantage mostly disappeared in the results from the vocabulary checklist.

A difficulty in evaluating these differing sets of results is that nouns and verbs appear with different frequencies, in different types of sentences, and in different contexts in these

languages. In fact, there are almost no experimental studies that have investigated whether, if the frequency of nouns and verbs is experimentally controlled, children either produce or comprehend nouns more quickly or more frequently than they do verbs. Of the three relevant experimental studies that have been conducted, only one provides evidence to suggest that nouns are easier to learn. Schwartz and Leonard (1984) found that toddlers who were taught 16 new nouns and verbs were able to learn more nouns than verbs and required between 20 and 40 exposures to learn the words they eventually produced. However, the children in their study were learning 16 words at a time with 64 objects and actions presented and named in each session. In two other studies, no differences were found. Tomasello and Akhtar (1995) found that 2-year-olds could learn both novel nouns and verbs with enough exposures, but there was no direct (p.313) comparison of how many or what kinds of exposures are needed in the two cases. Oviatt (1980) found no indications of noun-verb differences in the comprehension of 1-year-olds. In sum, additional systematic experimental tests of the relative ease of acquisition of nouns and verbs are needed.

In this chapter, we describe three experiments that address the noun-verb question in different ways. In the first experiment, we asked how many times (and on how many days) does a 2-year-old need to hear a word to be able to learn it, and does this differ for nouns and verbs? To address these two basic questions (which, surprisingly, have not yet been addressed fully experimentally), we taught children novel nouns and verbs, varying the number of models and the spacing of the models across days. We then tested children's comprehension and production of these words at various intervals. In addition, we followed the same procedures in teaching children nonverbal novel actions to see whether the same learning principles apply in a nonverbal task.

Thus, the study is one of only a handful studies that address a basic question in word learning—how many exposures are needed and on what schedule? In addition, it addresses an important controversy in the area, whether noun learning is privileged in language development or is not. Moreover, the inclusion of an unnamed new action provides an important

comparison point not available in other studies. In the presentation of nouns and verbs in any study (typically seen across different studies and not in the same study), it is common for novel objects in a noun learning study (or condition) to be shown as static objects, while in verb studies (conditions), objects are shown in dynamic events. That means that children learning verbs must attend to moving dynamic events and learn new words at the same time (as they do in everyday life). The noword new event condition in our study allows us to examine children's ability to remember dynamic events that are tied to new objects and to separate this event ability from their ability to learn a word to refer to new events (verb condition).

However, as is common in noun studies and verb studies, a limitation of this first experiment is that the sentences used to present the nouns and verbs may have favored nouns. Specifically, children in the noun condition heard, for example, “Look at this! This is a wuggy. See? It's a wuggy.” while children in the verb condition heard, “Look at this! It's dacking. See? It dacks.” Although these sentence structures are similar to each other, the noun phrasing is likely more common in naturalistic settings than is the verb sentence type because verbs often are embedded in sentences that are longer than these. (Again, note that this decision is common across noun and verb studies. Noun studies often use simple frames like the frames in the noun condition here, while verb studies typically use more complex frames—making the comparison of noun and verb learning across studies more difficult.) Thus, in a second study, we taught children four nouns and four verbs over two days, embedding the words in longer sentences (e.g., “The blick's spraying it” or “The dog's blicking it”). Embedding nouns in sentences like these is (p.314) fairly rare in the noun learning literature, while the presentation of novel verbs in these types of frames is fairly common. This second study thus investigates whether, when nouns and verbs are presented in comparable sentence contexts, controlling the number of exposures, and presenting a dynamic event in both the noun and verb conditions, nouns are easier to learn than are verbs.

A further question concerns whether studies that compare nouns to verbs would produce different results if different types of verbs or different types of action referents were presented. If children find it easier to learn transitive than intransitive verbs, for example, then studies that compare nouns with verbs should be viewed with these considerations in mind. In Study 3, we compare children's ability to learn intransitive and transitive verbs and their ability to understand verbs for selfaction as opposed to other action, to determine whether some of these verb and referent types are learned more quickly than are others. We then use these results to discuss whether the findings in the first two studies presented here are influenced by the types of verbs we chose.

Previous Studies of Noun and Verb Learning

Basic research in the area of children's word learning has revealed some general patterns of word learning. For example, research using a parental vocabulary checklist (the MacArthur-Bates Communicative Development Inventory [CDI]; Fenson et al., 1994) has shown that English-speaking 1-year-olds learn about one word a day, and two-year-olds learn about two words a day. In addition, children typically comprehend a word before they produce it (e.g., Benedict, 1979; Fenson et al., 1994; Goldin-Meadow, Seligman, & Gelman, 1976).

However, there is also evidence that some aspects of word learning differ depending on the type of word being learned. For nouns, young children can comprehend (or “fast map”) a new noun after only a few exposures (Carey & Bartlett, 1978; Markson & Bloom, 1997; Woodward, Markman, & Fitzsimmons, 1994). Children may have constraints or predispositions that help them connect nouns to objects (e.g., Golinkoff, Mervis, & Hirsh-Pasek, 1994; Markman, 1990); children appear to attend to shape when extending new nouns (e.g., Jones, Landau, & Smith, 1992); and children learning nouns may assume the speaker is referring to a category of objects (e.g., Waxman & Booth, 2000; Waxman & Markow, 1995).

Less is known about the general character of verb learning, perhaps because fewer studies have investigated the acquisition of verbs (e.g., Tomasello & Merriman, 1995). However, a prevailing view of early verb learning is that, compared to nouns, verbs appear to be relatively difficult to acquire. Although verbs (or action words) appear in children's earliest productive vocabularies, these vocabularies often contain many more nouns than verbs (Au et al., 1994; Caselli et al., 1999; Gentner, 1982; Jackson-Maldonado et al., 1993; Tardif et al., 1997, 1999). It is (p.315) unclear whether children have constraints or biases that guide early verb learning (though they may), and children may or may not fast map verbs as they do nouns (see e.g., Golinkoff, Jacquet, Hirsh-Pasek, & Nandakumar, 1996; Merriman, Marazita, & Jarvis, 1995, for evidence that they do). They appear to benefit from hearing verbs in an impending context (directly before they themselves perform an action) as opposed to during or following the action (Tomasello, 1995; Tomasello & Kruger, 1992). Several studies of verb learning using naturalistic observation and in the laboratory suggest that children are highly conservative in their use of new verbs, tending to use verbs only in the syntactic contexts in which a verb has been heard (Olguin & Tomasello, 1993; Tomasello, 1992) and resisting the extension of new verbs to some new events (Behrend, 1990; Forbes & Farrar, 1993, 1995). Some have tried to extend word learning principles to both nouns and verbs (e.g., Golinkoff et al., 1994; Golinkoff, Hirsh-Pasek, & Mervis, 1995); however, more evidence supporting this type of approach is needed. What seems more likely is that the processes that underlie noun and verb learning differ.

The comparison of nouns to verbs is largely a comparison across different studies, some investigating noun learning and some investigating verb learning. As a consequence, the methods used to teach a noun or verb vary across the studies being compared. We were interested in presenting 2.5-year-old children with new nouns or new verbs in a similar experimental context to examine whether differences in their ability to comprehend or produce the new words could be revealed. In Study 1, we also decided to include a nonverbal (action) condition because recent studies suggest that noun

learning either is similar to learning a nonverbal fact (Childers & Tomasello, 2003; Markson, 1999; Markson & Bloom, 1997) or it is not (Waxman & Booth, 2000). This nonverbal action condition is important because it can help to reveal whether children are having difficulty remembering new actions associated with objects or whether the problem lies in learning words that refer to new actions. Three previous studies have included nouns and verbs in a single study (Oviatt, 1980; Schwartz & Leonard, 1984; Tomasello & Akhtar, 1995), and only one of these studies (Schwartz & Leonard, 1984) demonstrates a difference in learning nouns and verbs (favoring nouns). In addition, one noun learning study shows that children can produce a new noun after approximately 6–8 sessions regardless of whether they are exposed to that noun once or twice per session (Schwartz & Terrell, 1983). This finding suggests that the distributed practice effect found across skills and across species (see Dempster, 1996; Underwood, 1961, for reviews) could also apply to children's word learning.

Given the need for studies that examine both noun and verb learning in a single study and the need for systemic investigations of how the number and timing of exposures influences word learning, we designed a study to address the following basic questions: How often does a child need to hear a word to be able to learn it? Is this different for different types of words? And once a word is comprehended or produced, how long will a child remember it?

(p.316) Study 1: 2-year-old Children Learn Nouns, Verbs, and Nonverbal Actions

We taught three different groups of 2.5-year-old children nouns, verbs, or non-verbal actions over one month (Childers & Tomasello, 2002). Each child in each of the three groups (n = 12 per group) was shown six sets of objects, one set for each of six timing of exposures conditions. Each set of objects contained three familiar (warm-up) objects and three novel objects. One novel object in a set was randomly selected as the target object before the study began and the other two served as distracters (see figure 12.1). For the noun group, six nouns

(*blick, gep, snarf, wuggy, danu, gazzer*) were randomly assigned to the target objects. The verb group used the same target and distracter objects in the same sets as the noun group. We designed six generic actions that could be performed with any of the novel objects and assigned a novel verb and action randomly to the target before the study began. The six verbs and actions were *keef* (experimenter balances object on two fingers, then flicks it to make the object wobble), *gorp* (experimenter puts object on her knee and lets go so it rolls down her leg), *pud* (experimenter throws the object on the floor, making it bounce) *meek* (experimenter starts the object spinning and the object spins), *dack* (experimenter flicks the object on its end and makes it tumble), and *tam* (experimenter starts the object twirling on its end). In the nonverbal action group, six generic actions were created that could be performed with any of the novel objects. (These actions included the experimenter's actions more than the actions designed for the verbs, which were about the actions of the object.) The six nonverbal actions were experimenter puts object on her head, experimenter catches object in the air, experimenter puts object on floor and spins it around, experimenter puts object on her elbow and moves it up and down, experimenter balances object on the back of her hand, and experimenter rolls object on her knee. The novel words, actions, and target objects were assigned to the sets before the study began and were the same across subjects.

During the study, each object set was randomly assigned to a timing of exposures condition in a counterbalanced manner across children. Two sets were presented on a massed schedule (all exposures on one day) and four were presented in varying distributed schedules. The two grouped schedules were Massed 4 (four exposures on one day) or Massed 8 (eight on one day). Two schedules distributed exposures over 4 days (Daily 4: one per day for 4 consecutive days; Widely Spaced 4: one per day with each exposure day separated by 3 days). Two schedules were designed as a compromise between massed and distributed schedules (Clumped 4:2 on one day, 3 intervening days, 2 on the second day; and Clumped 8: 2 on one day, 4 on one day, and 2 on one day with 3 days between

each exposure day). Two different ordering schedules were created, and half of the children in each word group received each order. Children generally were not exposed to more than two new words in one day.

(p.317)

(p.318) In addition to these variations in the timing of exposures, children were tested in both comprehension and production at three intervals: immediately following the learning phase, 24 hours later, and 1 week later.

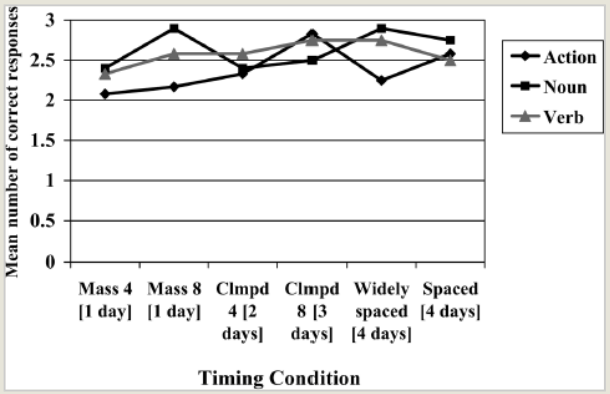

Figure 12.2. Mean number of correct target choices in comprehension (out of three) as a function of Item Learned and Timing of Exposures in Study 1.

In the *familiarization phase*, the experimenter produced a plastic bag full of the familiar and novel objects in a set. The experimenter drew out the three familiar objects in a random order and then the three novel ones. She showed each child each object, said something about it (different for different objects and word conditions), gave it to the child to play with, and then asked the child to put it in a bucket. When a nontarget object was introduced, the experimenter showed interest in it and commented by saying things like, “Look at this! It's really neat. See? What color is it? Can you put it in the bucket?” When the target object was shown, the experimenter produced a novel word in the sentence types appropriate to the child's word condition. In the noun condition, the experimenter labeled it with one or more pairs of sentences (depending on the timing conditions): for example, “Look at this! This is a wuggy. See? It's a wuggy.

Can you put it in the bucket?" In the verb condition, the three familiar objects were presented with a simple action and familiar verb (e.g., "Look at this. It swims/it rolls/I'm biting it."). For the three novel objects, a novel action was shown as the experimenter picked up the target object while saying, "Look at this! It's dacking. See? It dacks. Can you put it in the bucket?" (The experimenter showed interest in the other two novel objects.) Children in the nonverbal action condition experienced almost the same procedure but instead of a novel verb, the experimenter said, "Look at this! Look what we can do with this. See? Look what we can do with it. Can you put it in the bucket?"

In the *test phase*, children were asked to produce the novel word and then to comprehend the word using a forced choice task. In the noun group, the experimenter started by asking the child to name the three familiar objects (in random order). Then she asked for names of the three novel objects (in random order), saying, "Look at this! What is this called? Can you tell me? What is it?" In the comprehension task, the experimenter showed the child the set of familiar objects and asked the child to point to one of the objects. The experimenter then showed the child the set of novel objects (arrayed randomly) and asked her to choose the target by saying, "Show me the wuggy. Which one's the wuggy? Can you put it in the bucket?"

A similar procedure was followed for the verb group. In the production task, the experimenter asked the child to show her the action (familiar before novel) and to tell her what the action was called ("Look at this! What does it do? What does this do? What is it doing?"). Thus, children were asked to both enact the action and say the verb, and these responses were analyzed separately. In the comprehension task, the experimenter showed the child the three novel objects (arrayed randomly) and asked, "Show me the one that dacks. Which one was dacking? Can you put it in the bucket?" This type of comprehension task was designed for consistency across word conditions. If children remembered the target object (p.319) but not the associated action, this task would overestimate their knowledge of the verb and action.

In the nonverbal action condition, the experimenter held up each object (familiar before novel) and asked the child to show her the action (“Look at this. What do we do with this? What does this do?”). In the comprehension task, the experimenter enacted the action using her hand (e.g., patting her head) and asked the child to choose the target object (from the novel objects, arrayed randomly), saying, “Show me the one that goes like this. Show me the one that goes like this. Can you put it in the bucket?” As in the verb condition, this comprehension task may reveal more about whether children remembered the target object than whether they remembered the nonverbal action.

Although it was possible that children's responses would vary across the three retention intervals, we found no differences. If children could comprehend or produce a word immediately, they also remembered the word one day and one week later. This finding is consistent with the findings of Markson and Bloom (1997), Carey and Bartlett (1978), and others. However, in our study the spacing condition was a within-subjects variable so that after the immediate test, children were getting “reminders” at each testing session because the word or action was performed by the experimenter in the comprehension test. We also found no differences between the three word groups in children's comprehension abilities. Children were very good at recalling target objects across conditions, supporting the well-known advantage for comprehension over production (e.g., Fenson et al., 1994; Goldin-Meadow et al., 1976; see figure 12.2).

Differences between the word groups and the timing of the exposure conditions were found in children's productions. Nonverbal actions were the easiest to produce; children produced significantly more nonverbal actions than nouns in three timing conditions and more actions than verbs in five conditions. Thus, in general, children found it easier to demonstrate the action an adult had performed with an object than to verbally produce the word they had used for that object (noun) or the word for that associated action (verb).

Children produced almost twice as many nouns as verbs overall (see figure 12.3). We also coded whether children

could demonstrate the correct action on the target object in the verb condition, and they could. Both this measure and the non-verbal action results show that children could remember novel actions associated with specific target objects but had difficulty verbally producing the verb itself.

The variations in the timing of exposures affected the two types of words more than it affected the nonverbal actions. Specifically, the two massed conditions (Massed 4, Massed 8) were inferior to the distributed condition (Daily 4) for both nouns and verbs. Also, for both nouns and verbs there was at least one condition with four distributed exposures that was statistically higher than another condition with eight massed exposures.

The current findings provide some experimental support for the idea that nouns are easier to learn than verbs (Gentner, 1982; Gentner & Boroditsky, 2001), (p.320) at least for English-speaking children. However, the way we taught and tested our nouns and verbs should be carefully considered. In our study, children in the noun group were asked to map a new word onto a new object (as is common in noun learning). Children in the verb group had to map a new word onto an action that was related to a specific object. Although this allowed us to be able to teach and test the verbs in a way that was similar to the nouns, in everyday contexts, verbs are mostly used for a range of objects. Thus, we could have increased the difficulty in the verb condition by our insistence that they attach the verb to a single object. On the other hand, children in the nonverbal action condition seemed to readily attach new actions to specific objects.

More important perhaps, our verb

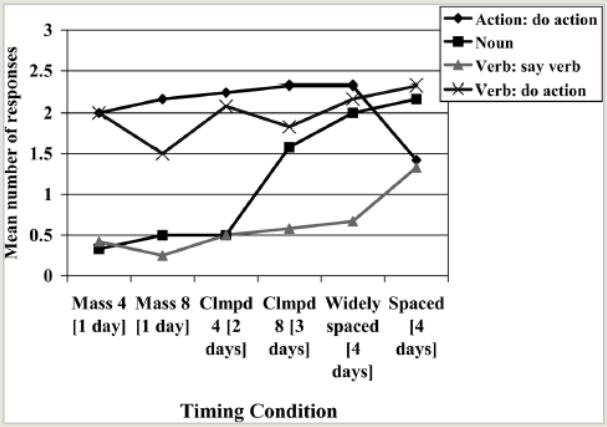

Figure 12.3. Mean number of times word produced (out of 3) as a function of Item Learned and Timing of Exposures in Study 1.

comprehension task may have favored nouns because the dependent measure was children's choice of the target object that was associated with the new action. In our production test, we asked children in the verb condition to produce both the action and the verb label. Thus, children in this condition were asked to make two responses (reproduce the action and say the verb), while children in the noun condition only needed to make one response (say the noun). On the other hand, testing verb production in this way allowed us to demonstrate that what children in the verb condition were having difficulty accomplishing was not mapping actions to specific objects (they were able to reproduce the action) but learning verbs to refer to these actions—which is the task faced in everyday verb learning situations. A third limitation of this first experiment is that the sentences in which the words were embedded are probably more common (p.321) for nouns than verbs because verbs often are embedded in longer sentences. In a second study, we taught children nouns and verbs embedded in longer sentences.

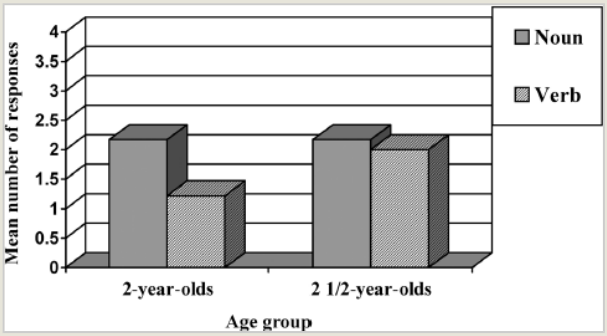

Figure 12.4. Comprehension data from Study 2.

Two other difficult decisions were (1) whether to teach the verb in a transitive or intransitive sentence frame ("The ball is meeking" vs. "I'm meeking the ball") and (2) whether to use the verb to describe the child's action or that of an object (or other person). There is some indirect evidence that children learn some kinds of verbs better when they are used for their own actions (e.g., Huttenlocher, Smiley, & Charney, 1983; Roberts, 1983). We explored the consequences of our verb decisions in our third study.

Study 2: Nouns and Verbs Embedded in Sentences

In our second study, we taught 18 2-year-old children (mean age = 2 years, 2 months; range = 2 years, 0 months–2 years, 3 months) and 18 2.5-year-old children (mean age = 2 years, 8 months; range = 2 years, 4 months–2 years, 11 months) four nouns and four verbs over two days. Twelve girls and 23 boys participated. In this study, children, regardless of whether they were learning nouns or verbs, saw novel objects undergoing simple novel actions and always heard the target word embedded in a longer sentence (i.e., words were not in simple labeling phrases or sentence-final). To our knowledge, no other study has directly compared noun and (p.322) verb learning showing the same objects in the same events and using these types of sentences.

On the first of two days, the experimental session began with the presentation of four familiar objects undergoing actions. The experimenter removed each object from an opaque bag

and demonstrated an action for approximately 30 seconds (e.g., pulled an apple in a toy wagon; hit a firetruck with her hand). The experimenter then showed the child the first novel object undergoing an action that was accompanied by a noun or a verb. During this presentation, the child heard four pairs of the novel word. Words were presented one at a time and were demonstrated with a familiar puppet (e.g., a dog). For example, for the first word, the experimenter showed a puppet using a novel object to blow on a carpenter's level (see table 12.1 for a complete list of stimuli). Children hearing nouns first heard, “Look. The blick's spraying it,” while children hearing verbs first heard, “Look. The dog's blicking it.” The order of the words was set up such that two nouns were always presented one after the other, and two verbs were presented one after the other. Whether the nouns were shown first or the verbs were shown first was counterbalanced across children.

Immediately following the presentation of each new word, children were asked to produce the word. In the noun sets, children heard, “Look at this. What's this? What's this called? Can you tell me? What is it?” In the verb sets children heard, “Look at this. What does this do? What's it doing? Can you tell me? What's it doing?” After the production task for the first word, children were taught a second word and given a second production test for that new word. At the end of the pair of words, both noun or both verb, children were given a comprehension test. In the comprehension test, two familiar object sets (from the four that were introduced before the novel words were presented) were placed randomly with the two novel sets just presented. The experimenter first asked the child to point to one of the familiar objects, and then asked the child to point to each of the novel targets in a random order (e.g., nouns: “Where's the_____? Can you give me the_____? Where is it? Can you point to it?”; verbs: “Where's the one that was_____ing? Which one_____s? Can you point to it?”). Once the child had made a choice of an object set, that set was replaced in the array and available on subsequent test questions. Thus, on every comprehension question, children were able to choose from four object sets, two familiar and two associated with the new words. Children were never

choosing between an object set used for a noun and one used for a verb. They were hearing nouns (or verbs) for all four object sets (two familiar and two novel) and then were demonstrating whether they had successfully associated a particular noun (or verb) with a particular set or had not.

The procedure of introducing the new words, eliciting production of each word, and then asking the child to point to the object sets that were associated with each new word was repeated for the next two words with the only difference being two different familiar objects (from the four that had been seen) were used in the second set of comprehension questions. The experimenter returned on a (p.323) second day and repeated the entire process with four new familiar object sets, two new object sets associated with new nouns and two associated with new verbs.

Table 12.1 Materials for Study 2

"Animate" puppets (agents):
a dog, a frog, a sheep, a bird
Familiar objects and familiar actions:
Day 1
grab car off dartboard
pull apple in wagon
hit firetruck with hand
pour strawberry from cup
Day 2
throw chair in box
carry cake in basket
eat pizza slice
shake rattle

Novel objects and novel actions:

Day 1

use orange blower to blow on a carpenter's level
use a rake to rake a brillo pad
use a paint scraper to flip a coffee-filter-clamp over
bounce a party horn up and down on a leash

Day 2

use a magnet on a stick to pick up a paint scraper
put twisted straw in funnel and turn straw around
mix drain plug in a hand mixer
use a roller to roll the top of a black box with a button

Novel nouns and verbs:

blick, blicking	gep, gepping
gazzer, gazzing	wug, wugging
pud, puding	modi, modeing
keef, keefing	snarf, snarfing

Because the comprehension and production tasks involved different types of test trials with different probabilities for responses, we analyzed each task separately. For the comprehension task, a repeated measures ANOVA was computed with Word (noun, verb) as a within-subjects factor and Age (younger, older) as a between-subjects factor; the dependent variable was the number of correct choices at test. The analysis revealed a main effect of Word, $F(1, 34) = 4.64$, (p.324) $p < .05$, no main effect of Age, and no interaction. Overall, children comprehended more nouns than verbs (see figure 12.4).

In addition to comparing noun and verb responses to each other, a separate question is whether responses differed from chance. Following each comprehension test question, children

were given four object sets from which to choose. Thus, if children were choosing randomly, they should make the correct choice 25% of the time, or on one of the four comprehension trials. One sample *t* tests with Bonferroni corrections ($p < .025$) were used to compare children's comprehension means to chance. In the younger age, children's responses to the noun comprehension questions (mean = 2.17, $SD = 1.04$) exceeded chance, $t(17) = 4.75$, $p < .001$; children's responses to the verb comprehension questions did not (mean = 1.22, $SD = .94$). In the older age, children's responses to the noun comprehension questions (mean = 2.17, $SD = 1.29$) and verb comprehension questions (mean = 2.00, $SD = 1.37$) exceeded chance, $t(17) = 3.82$, $p < .01$, and $t(17) = 3.09$, $p < .01$ respectively.

To examine children's responses in the production task, a repeated measures ANOVA was computed with Word (noun, verb) as a within subjects factor and Age (younger, older) as a between subjects factor; the dependent variable was the number of correct productions at test. This analysis revealed a trend towards significance for Age group, $F(1, 34) = 4.02$, $p < .06$. Children in the older age produced, on average, approximately one new word (either noun or verb), while children in the younger age did not (see table 12.2).

In Study 1, 2.5-year-old children did not differ in their ability to comprehend new nouns and new verbs. While children in Study 2 across age comprehended more nouns than verbs, the results from the one sample *t* tests suggest that the (p.325) advantage for nouns was most evident in the responses produced by the younger 2-year-old children. A difference in the findings of the two studies was that in Study 1, older 2-year-olds produced more nouns than verbs while in Study 2, noun and verb production did not differ. This difference may have emerged because the noun sentence frames in Study 1 were simpler than the verb sentence frames in Study 1 and the noun and verb sentence frames in Study 2. Thus, children's ability to produce new nouns in Study 1 may have benefited from the simple frames in which nouns were heard. A strength of Study 2 is that the presentation of the objects in motion and the use of the same types of sentences for embedding the new

words make the noun and verb conditions much more comparable in Study 2 than they were in Study 1. Overall, Study 2 suggests that when these conditions are comparable, evidence for a "noun advantage" is most clearly present in the responses of younger 2-year-olds and not older ones.

Table 12.2 Results of Study 2 production

	Word Type	
	Noun	Verb
Child Age		
Younger	.44 (.70)	.28 (.57)
Older	.94 (1.09)	.94 (1.25)

(Table 12.2) shows the mean number of productions (s.d.) of the four novel nouns and four novel verbs.

A lingering question from both studies is whether the type of verb being learned matters. Is it more difficult for children to learn some types of verbs (e.g., intransitives, verbs for other people's actions) as compared to other types (e.g., transitives, verbs for their own actions)? If there is a difference in children's ability to learn some verbs as compared to others, a noun advantage may be revealed more strongly in some cases (e.g., names for concrete objects vs. words for intransitive or other agent actions) than in others. The final study simply examines whether some verbs are easier for a 2-year-old child to learn.

Study 3: Are Some Types of Verbs Easier to Learn Than Others?

A tricky issue for verb researchers is deciding the type of verb to include in a study. If studying nouns, it is common to include nouns that can be thought of as at the basic level (e.g., Rosch & Mervis, 1975). However, there is no clear "basic level" for verbs, and findings from individual studies may vary for the simple reason that they focus on different types of verbs. For example, in Huttenlocher et al. (1983), "movement" verbs (e.g., *kick, jump, wave*) were contrasted with "multientity (p.326) change verbs" (e.g., *clean, put down,*

give). Forbes and Farrar (1993) focused on a group of novel motion verbs in which “a subject or object (was changed) or being caused to change position or location” (p. 276). Behrend (1990) focused on action verbs (e.g., *pound*) which focus on “the physical movement of an agent without … the result of that movement” (p. 682) as opposed to result verbs (e.g., *break*) that refer only to the result and not the way that result was produced. The results from Studies 1 and 2 could be limited by the types of verbs we chose to contrast with nouns in the studies. Study 3 examines two potential influences: whether children are learning transitive or intransitive verbs, and whether children themselves are the agent or not when they are exposed to the new verb. If these two factors emerge importantly in Study 3, then the results from Studies 1 and 2 should be considered with these verb choices in mind.

One reason to believe that children would learn transitive verbs more easily than intransitives would be that transitives conform to a “prototypical” event type in which an agent acts directly on a patient (Slobin, 1985). However, studies of everyday speech in naturalistic contexts do not show a clear advantage for either verb type (e.g., Tomasello, 1992). Our study tests whether an advantage for transitives holds if children are given equivalent experiences with transitive and intransitive verbs (see Naigles, 1990; Hirsh-Pasek & Golinkoff, 1996, for preferential-looking studies of attention to transitive and intransitive sentence frames).

A second question is whether children are better at learning verbs that refer to their own actions (e.g., Huttenlocher et al., 1983). If children are better at learning verbs for their own actions and were presented with verbs for the experimenter's actions or the action of an object in Studies 1 and 2, then those studies may underestimate verb learning. For example, in Huttenlocher et al. (1983, Study 2), 90% of children's (age 24–26 months) utterances with verbs were produced when they were involved in an action in some way. In these utterances, children were either describing their own actions, describing the action of the toys involved, or making a request for action from another person. Huttenlocher et al. concluded that children were mostly using verbs for self-action. However,

Edwards and Goodwin (1986) have noted that children in Huttenlocher et al.'s study produced verbs in response to observed action (*come, go*, and *do*) but these uses were discounted. In Huttenlocher et al., Study 3, infants (starting at 1 year) were asked to follow an instruction or point to one of two films and could follow an instruction directed to them before they could point to the correct depiction of a verb in a film. Huttenlocher et al. viewed these results as supportive of a "self-action first" account, but the results could also simply stem from the greater likelihood that children would get practice following commands as opposed to pointing to screens in everyday life. Edwards and Goodwin (1986) found that self and other action emerged differently for different verbs. For example, *pull* and *stuck* were used only for self-action while *shut* and *open* were often used for self-action but also used for other action. They argued that patterns of verb usage for (p.327) self-action and other action resulted from particular communicative needs. A third study (Roberts, 1983) examined young 2-year-olds' ability to enact an action using their own body in response to sentences (with familiar verbs) that referred to the child as an agent or referred to another person as the agent. Roberts found that young 2-year-old children performed best in this task if they were the agent. A limitation of this study is that the dependent variable, latency to move, was somewhat difficult to measure.

There are only a small number of studies examining self and other action. These studies focus on familiar verbs and do not conclusively show an earlier ability to comprehend or produce new verbs that refer to self as opposed to other action. Much of the data supporting a self-first view is spontaneous production data that could be influenced by the child's desire to talk about particular events, not his or her ability to conceive of or learn words for specific (other agent) events. We introduced novel verbs and controlled the exposure to new verbs for the self or other to ensure the child heard an equal number of exposures to both. We also implemented the same testing procedure to test comprehension and production of verbs with self as agent and other agents. In sum, this study could be important for researchers considering the self-other distinction; however, it is important for understanding Studies

1 and 2 because it could reveal an important situational factor that could have had a major influence in those studies.

In this third study, we taught 24 2-year-old children (mean age = 2 years, 1.5 months; range: 1 year, 10 months–2 years, 4 months) four nouns and four verbs over two days. We varied both the agent who performed the action (child, puppet) and the type of verb presented (transitive, intransitive) in a within-subjects design. That is, each child heard one new verb of each type: a child-transitive verb, a child-intransitive verb, an other-agent transitive verb, and an other-agent intransitive verb, with two verbs presented on each of two days.

Each of the four novel target events could be enacted by the experimenter as either a transitive or intransitive action. For example, in one event, the experimenter squeezed a nasal aspirator into the air (intransitive) or used the aspirator to spray air onto a small table (transitive). In the other three target events, the experimenter moved the top of a soda can crusher back and forth (intransitive) or used the top of the crusher to squeeze a Nerf ball (transitive), used a pasta fork to perform a raking action (intransitive) or used the fork to rake confetti (transitive), and bounced the end of a child safety leash (intransitive) or bounced a banana up and down with the leash (transitive). In addition to these target actions, we designed eight distracter events that corresponded to familiar verbs (*turn, pull, brush, pick up, close, mix, hit*, and *get*).

On the first day, the experimenter introduced one target event and two distracters in a random order. She began by enacting the events one at a time while either producing neutral positive comments for the distracter actions or producing the appropriate verb for the target action. Each verb was produced three times for a single event (impending, ongoing, and completed) before a different event was **(p.328)** introduced. In the distracter events the child heard three sentences with similar impending, ongoing and completed action contexts that contained general verbs. In the new verb events, the child heard novel verbs in the three sentence contexts.

If the verb was assigned to the self-agent condition, the experimenter first enacted the event (“Let's play a game. Look what I can do. Now it's your turn.”) and then asked the child to enact the event. During the child's enactments, the experimenter produced the new verb (e.g., “You're going to meek it. Wow, can you play the game? You're meeking it. Look. You meeked it.”). (If the verb was an intransitive, the same sentence frames were produced without the final pronoun, e.g., “You're meeking.”) During the two distracter events, the same procedure was followed; however, the experimenter did not produce the new verb (e.g., “Look at this. Look what this can do. Now it's your turn. You're going to play. You're doing great. Wow. You got a turn.”).

In the other-agent condition, the experimenter asked the child to choose a puppet to enact the event. The experimenter then enacted the event with the puppet (“Let's play a game. Look what he can do. Now it's your turn.”) and gave the child a turn to enact the event. The experimenter then enacted the event three more times while producing the new verb if appropriate (e.g., “Now it's Big Bird's turn again. He's going to pilk. He's pilking. Look. He pilked.”). In the distracter games, the same procedure was followed but no new verb was presented.

Whether children heard self-agent or other-agent sentences, after each event had been shown and the appropriate sentences had been produced three times, the next game in a set was introduced. This process was repeated until the child had played each game in a set three times and heard each verb a total of nine times.

At this point, the experimenter presented the child with a production test (always first) and a comprehension test. In the production test, the experimenter demonstrated each of the three games in the set in a random order and asked the child to produce the verbs. In the child-agent question, the experimenter asked the child to enact the event and then say the verb (e.g., “Now let's play this game. It's your turn. Can you do it? What are you doing?”). In the other-agent question, the experimenter asked the child to choose a puppet first and then asked the question (e.g., “Now watch. It's the [puppet's] turn. Watch what he's doing. What is he doing?”).

Following the production questions, the experimenter asked the child two sets of comprehension questions. In the child-agent comprehension question, the experimenter asked the child to choose the correct event from the three presented (one heard with a novel verb and two heard with distracter phrases) and enact the event (e.g., “Now [child's name]. You're going to meek it. You're meeking it. Show me [child's name's] meeking it.”). In the other agent comprehension question, the experimenter asked the child to first choose a puppet and then enact the event (e.g., “Now the [puppet]. He's going to pilk. He's pilking. Show me he is pilking.”). Both the production questions and the comprehension questions (p.329) presented in the test phase (child-agent or other-agent first) were presented in a random order.

Given the difference between comprehension and production task demands, the data from each of these was analyzed separately. We first examined children's comprehension of the new verbs using a 2 (Verb: transitive, intransitive) by 2 (Agent Training: other, self) by 2 (Question at Test: other, self) repeated measures ANOVA; the dependent measure was the mean number of events enacted correctly at test. The analysis revealed a trend for Question, $F(1, 23) = 4.02$, $p < .06$, and a significant Agent by Question interaction, $F(1, 23) = 5.24$, $p < .05$. A post-hoc test with Bonferroni corrections revealed that when children initially heard a new verb that referred to their own actions, they were better at responding to questions that referred to their own actions than questions that referred to another agent's actions, $t(23) = 2.51$, $p = .02$ (see table 12.3). This was not true of the verbs in which children saw a puppet agent (i.e., in this case, they were able to respond to either question type). A similar analysis of the production data revealed a significant main effect of Question, $F(1, 23) = 6.27$, $p < .05$. In the production test, children were more likely to produce a new verb when they were asked a question with a puppet as the agent.

We found no effect or interaction of verb type suggesting that transitive verbs did not differ from intransitive verbs in this task (which was similar to the tasks used in Studies 1 and 2). In addition, there was no main effect of agent during training

suggesting that, overall, children did not learn these actions better when the verbs were produced when the child was the agent as opposed to when the experimenter was the agent. In the comprehension task, children showed more flexibility if they were not the agent when they learned the new verb. In production, children were more likely to produce the verb (in response to the test question) if the experimenter was the agent, perhaps because they could focus on their productions.

Could these results simply stem from the methodological decision to use a puppet as an agent for the other-agent condition? Note that this choice does not (p.330) directly bear on the important findings Study 3 provides for Studies 1 and 2. The tasks are similar during the learning and test phase in all 3 studies, and Study 3 shows that the use of puppets during the learning phase or test phase does not greatly influence results given these tasks. In addition, the use of puppets does not bear directly on the transitive/intransitive results. The use of a puppet as other agent only has bearing on the ability of the results in Study 3 to address the self-other agent distinction more generally. On the one hand, this use allowed us to present the verbs in a similar way and test for comprehension and production using the same methodology. On the other hand, the child in the comprehension task was always the actual agent because he or she needed to serve as agent in some way to complete the enactments (i.e., in the other-agent comprehension enactment, the child demonstrated using a puppet: “Show me he is pilking.”).

Table 12.3 Results of Study 3

	Question Type	
Task Agent	Child	Other
Comprehension Child	1.2 (.78)	.7 (.81)
Other	1.0 (.75)	1.1 (.61)
Production Child	.7 (.87)	1.0 (.81)
Other	.8 (.72)	1.0 (.83)

(Table 12.3) shows the mean number of trials (s.d.) children comprehended or produced the novel verb out of two (N = 24).

Previous research has suggested that children learn new verbs that refer to their own actions before verbs that refer to other agent's actions (e.g., Huttenlocher et al., 1983). However, previous studies have focused on familiar verbs and may have been influenced by many factors including the number of exposures children had with particular agents and these verbs. Children may often hear verbs that refer to their own actions, but our study shows that if they are exposed equally to other agents, they are just as able to learn verbs to refer to these agents' actions—at least from 26 months of age. Importantly, given the similarity in children's responses to transitive and intransitive verbs as well, it is less likely that the findings in Studies 1 and 2 are a product of the particular types of verbs presented, and more likely that the same results also would be found in studies including other verb types.

General Discussion

Our first two studies are two of only a handful of studies (Oviatt, 1980; Schwartz & Leonard, 1984) that have directly compared noun and verb learning in the same study systematically controlling the number of exposures in the laboratory. The results from both Studies 1 and 2 suggest that, all things being equal, 2-year-olds show a more robust ability to learn new nouns as compared to verbs. Thus, we have presented two studies with converging results that support the same conclusion. Moreover, Study 2 is the first study to

equate noun and verb conditions in terms of task (children see dynamic events in both conditions) and sentence type (new words are embedded in longer sentences in both conditions), and thus it provides the strongest evidence to date suggesting that nouns are easier to learn than are verbs.

In Study 1, 2.5-year-olds were able to comprehend nouns and verbs across a variety of timing conditions. These children could produce both new nouns and new verbs in what could be thought of as the ideal learning condition—distributed exposures to the new word over about a week. However, they also were able to produce new nouns in less ideal conditions—including a condition in which (p.331) exposures to the new word are separated by days—but had trouble producing new verbs in these less ideal conditions. This tendency to be less vulnerable to various factors, but only in noun learning, was mirrored in the comprehension findings in Study 2. In Study 2, at 2 years, children had difficulty comprehending new verbs in less ideal learning contexts while showing an ability to comprehend new nouns in these contexts. Taken together, these results show a developmental progression in children's ability to learn new words, as well as providing additional evidence concerning the specific conditions in which nouns are advantaged. That is, younger 2-year-olds may comprehend nouns with fewer exposures as compared to verbs, which may help them to then learn to produce these nouns by 2.5 years with fewer exposures, or greater delays between exposures, as well.

There are differences in noun/verb productions across languages. Experimental studies that control the number and timing of exposures to nouns and verbs in the laboratory, and that include other languages are needed. Children learning English, Italian, and Spanish appear to especially favor nouns (object words) as opposed to other word types in their early vocabularies (Au, Dapretto, & Song, 1994; Gentner, 1982; Jackson-Maldonado et al., 1993; Tardif et al., 1997, 1999) while children acquiring Mandarin Chinese (Tardif, 1996; Tardif et al., 1997, 1999) and perhaps Korean (Gopnik & Choi, 1995; see also Au et al., 1994; Kim et al., 2000) are not as heavily “noun biased.”

These differences across languages could be due to differences in linguistic factors between languages, including differences in the morphological complexity of nouns and verbs, as well as cultural factors, including the frequency with which caregivers appear to label objects or talk about actions. For example, in Mandarin, verbs are marked for aspect but not person or number, and the marking for aspect is found in a separate morpheme that does not change the stem (Tardif et al., 1997). Thus, the verb morphology system in Mandarin may be highly transparent (Slobin, 1973) to the child, which may promote verb learning in Mandarin. In addition, Mandarin- and perhaps Korean-speaking parents do not appear to spend as much time focusing on object labels as do English-speaking parents (Gopnik & Choi, 1995; Tardif et al., 1997, 1999). English-speaking parents appear to spend a fair amount of time labeling objects and reading picture books, both of which could promote noun learning (Fernald & Morikawa, 1993; Goldfield, 1993). However, if frequency was the only factor facilitating noun learning, in our study in which frequency was held constant, children should have learned both nouns and verbs, and they did not. Of course our English-speaking children may have been especially practiced in the learning of new nouns as compared to verbs and so studies of this type including children learning other languages are needed.

In addition to linguistic factors (e.g., morphological complexity) and cultural factors (e.g., frequency), there remains a cognitive explanation for the dominance of nouns in early vocabularies. Gentner's (1982) proposal and more recent expansion (Gentner & Boroditsky, 2001) suggests that words for concrete objects should emerge earlier in development because the objects themselves are highly coherent (p.332) and can be preindividuated and the words that refer to these objects primarily function to denote specific entities by themselves. In contrast, events are conceptualized in different ways across languages, and verbs and other relational terms depend on other words in sentences (e.g., arguments) for meaning. We provide some evidence of the difference between understanding an action and learning a verb in the nonverbal action condition in Study 1. In that study, children were able to demonstrate both new nonverbal actions and new actions

that had been accompanied by verbs but had difficulty verbally producing a new verb. Therefore, connecting new verbs to new actions appeared to be more of a problem than was understanding (or packaging) the new actions themselves. Of course it is possible that attending to a new action is so cognitively demanding that children have trouble also attending to the new verb, and this difficulty would fit with Gentner's (1982; Gentner & Boroditsky, 2001) hypotheses. However, our studies demonstrate that the difference between noun and verb learning not only is a difference in understanding objects and events in and of themselves but lies in children's ability to connect new words to these events.

Studies of children's spontaneous speech and parental reports of early vocabularies are important. However, a new focus of word learning researchers could be to begin to investigate more carefully in the laboratory the specific conditions under which children are able to learn nouns or verbs. By gathering more experimental evidence demonstrating when and how children learn nouns compared to verbs, we can then draw inferences about the cognitive difficulties children may face. We have shown that if one wanted a 2- or 2.5-year-old English-hearing child to learn a new noun, it could be presented on a single day (eight exposures) for comprehension or on at least 3 days (that do not have to be consecutive) for production. To teach a child a new verb, a 2.5-year-old need only have the chance to be exposed to that verb on a single day (eight exposures) to begin to comprehend that verb (and this is not enough for a 2-year-old), but needs to hear that verb repeated on consecutive days for about a week to be able to reliably produce that verb. These facts of language learning support a view in which noun learning is more robust and less vulnerable to variations in presentations than is verb learning, perhaps because objects are conceptually “easier” to package.

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References

Bibliography references:

Au, T. K., Dapretto, M., & Song, Y. (1994). Input vs. constraints: Early word acquisition in Korean and English. *Journal of Child Language, 33*, 567–582.

Behrend, D. (1990). The development of verb concepts: Children's use of verbs to label familiar and novel events. *Child Development, 61*, 681–696.

Benedict, H. (1979). Early lexical development: Comprehension and production. *Journal of Child Language, 6*, 183–200.

Carey, S., & Bartlett, E. (1978). Acquiring a single new word. *Papers and Reports on Child Language Development, 15*, 17–29.

Caselli, M. C., Casadio, P., & Bates, E. (1999). A comparison of the transition from first words to grammar in English and Italian. *Journal of Child Language, 26*, 69–111.

Childers, J. B., & Tomasello, M. (2002). Two-year-olds learn novel nouns, verbs, and conventional actions from massed or spaced exposures. *Developmental Psychology, 38*, 967–978.

Childers, J. B., & Tomasello, M. (2003). Children extend both words and non-verbal actions to novel exemplars. *Developmental Science, 6*, 185–190.

Dempster, F. (1996). Distributing and managing the conditions of encoding and practice. In E. Bjork & R. Bjork (Eds.), *Handbook of perception and cognition* (2nd ed., pp. 317–344). New York: Academic Press.

Edwards, D., & Goodwin, R. (1986). Action words and pragmatic function in early language. In S. A. Kuczaj & M. D. Barrett (Eds.), *The development of word meaning: Progress in cognitive development research* (pp. 257–273). New York: Springer-Verlag.

Fenson, L., Dale, P., Reznick, J. S., Bates, E., Thal, D., & Pethick, S. J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development, 59*, v–173.

Fernald, A., & Morikawa, H. (1993). Common themes and cultural variations in Japanese and American mothers' speech to infants. *Child Development, 64*, 637–56.

Forbes, J. N., & Farrar, M. J. (1993). Children's initial assumptions about the meaning of novel motion verbs: Biased and conservative? *Cognitive Development, 8*, 273–290.

Forbes, J. N., & Farrar, M. J. (1995). Learning to represent word meaning: What initial training events reveal about children's developing action concepts. *Cognitive Development, 10*, 1–20.

Gentner, D. (1982). Why nouns are learned before verbs: Linguistic relativity versus natural partitioning. In S. A. Kuczaj, II (Ed.), *Language development: Vol. 2. Language, thought and culture* (pp. 301–344). Hillsdale, NJ: Erlbaum.

Gentner, D., & Boroditsky, L. (2001). Individuation, relativity, and early word learning. In M. Bowerman & S. C. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 215–256). Cambridge: Cambridge University Press.

Goldfield, B. A. (1993). Noun bias in maternal speech to one-year-olds. *Journal of Child Language, 20*, 85–99.

Goldin-Meadow, S., Seligman, M., & Gelman, R. (1976). Language in the two-year-old. *Cognition, 4*, 189–202.

Golinkoff, R. M., Hirsh-Pasek, K., & Mervis, C. B. (1995). Lexical principles can be extended to the acquisition of verbs. In M. Tomasello & W. E. Merriman (Eds.), *Beyond names for*

things: Young children's acquisition of verbs (pp. 185–221). Hillsdale, NJ: Erlbaum.

Golinkoff, R. M., Jacquet, R. C., Hirsh-Pasek, K., & Nandakumar, R. (1996). Lexical principles may underlie the learning of verbs. *Child Development, 67*, 3101–3119.

Golinkoff, R. M., Mervis, C. B., & Hirsh-Pasek, K. (1994). Early object labels: The case for a developmental lexical principles framework. *Journal of Child Language, 21*, 125–155.

Gopnik, A., & Choi, S. (1995). Names, relational words, and cognitive development in English and Korean speakers: Nouns are not always learned before verbs. In M. Tomasello & W. E. Merriman (Eds.), *Beyond names for things: Young children's acquisition of verbs* (pp. 63–80). Hillsdale, NJ: Erlbaum.

Hirsh-Pasek, K., & Golinkoff, R. M. (1996). *The origins of grammar: Evidence from early language comprehension*. Cambridge, MA: MIT Press.

Huttenlocher, J., Smiley, P., & Charney, R. (1983). Emergence of action categories in the child: Evidence from verb meanings. *Psychological Review, 90*, 72–93.

Jackson-Maldonado, D., Thal, D., Marchman, V., Bates, E., & Gutierrez-Clellen, V. (1993). Early lexical development in Spanish-speaking infants and toddlers. *Journal of Child Language, 20*, 523–549.

Jones, S., Landau, B., & Smith, L. B. (1992). Syntactic context and the shape bias in children's and adults' lexical learning. *Journal of Memory and Language, 31*, 807–825.

Kim, M., McGregor, K. K., & Thompson, C. K. (2000). Early lexical development in English- and Korean-speaking children: Language-general and language-specific patterns. *Journal of Child Language, 27*, 225–254.

Markman, E. M. (1990). Constraints children place on word mearnings. *Cognitive Science, 14*, 57–77.

Markson, L. (1999). *Mechanisms of word learning in children*. Unpublished doctoral dissertation, University of Arizona.

Markson, L., & Bloom, P. (1997). Evidence against a dedicated system for word learning in children. *Nature, 385*, 813–815.

Merriman, W. E., Marazita, J., & Jarvis, L. (1995). Children's disposition to map new words onto new referents. In M. Tomasello & W. E. Merriman (Eds.), *Beyond names for things: Young children's acquisition of verbs* (pp. 147–183). Hillsdale, NJ: Lawrence Erlbaum.

Naigles, L. G. (1990). Children use syntax to learn verb meanings. *Journal of Child Language, 17*, 357–374.

Olguin, R., & Tomasello, M. (1993). Twenty-five-month-old children do not have a grammatical category of verb. *Cognitive Development, 8*, 245–272.

Oviatt, S. (1980). The emerging ability to comprehend language. *Child Development, 51*, 97–106.

Roberts, K. (1983). Comprehension and production of word order in Stage 1. *Child Development, 54*, 443–449.

Rosch, E., & Mervis, C. B. (1975). Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology, 7*, 573–605.

Schwartz, R. G., & Leonard, L. B. (1984). Words, objects, and actions in early lexical acquisition. *Journal of Speech and Hearing Research, 27*, 119–127.

Schwartz, R., & Terrell, B. (1983). The role of input frequency in lexical acquisition. *Journal of Child Language, 10*, 57–66.

Slobin, D. I. (1973). Cognitive prerequisites for the development of grammar. In C. A. Ferguson & D. I. Slobin (Eds.), *Studies of child language development* (pp.175–208). New York: Springer.

Slobin, D. I. (1985). Crosslinguistic evidence for the language-making capacity. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition: Vol. 2. Theoretical issues* (pp. 1157–1249). Hillsdale, NJ: Lawrence Erlbaum.

Tardif, T. (1996). Nouns are not always learned before verbs: Evidence from Mandarin speakers' early vocabularies. *Developmental Psychology, 32*, 492–504.

Tardif, T., Gelman, S. A., & Xu, F. (1999). Putting the noun bias in context: A comparison of English and Mandarin. *Child Development, 70*, 620–635.

Tardif, T., Shatz, M., & Naigles, L. (1997). Caregiver speech and children's use of nouns versus verbs: A comparison of English, Italian and Mandarin. *Journal of Child Language, 24*, 535–65.

Tomasello, M. (1992). *First verbs: A case study of early grammatical development*. New York: Cambridge University Press.

Tomasello, M. (1995). Pragmatic contexts for early verb learning. In M. Tomasello & W. E. Merriman (Eds.), *Beyond names for things: Young children's acquisition of verbs* (pp. 115–146). Hillsdale, NJ: Erlbaum.

Tomasello, M. (2003). *Constructing a language*. Cambridge, MA: Harvard University Press.

Tomasello, M., & Akhtar, N. (1995). Two-year-olds use pragmatic cues to differentiate reference to objects and actions. *Cognitive Development, 10*, 201–224.

Tomasello, M., & Kruger, A. (1992). Joint attention on actions: Acquiring verbs in ostensive and non-ostensive contexts. *Journal of Child Language, 19*, 311–333.

Tomasello, M., & Merriman, W. E. (1995). *Beyond names for things: Young children's acquisition of verbs*. Hillsdale, NJ: Erlbaum.

Underwood, B. (1961). Ten years of massed practice on distributed practice. *Psychological Review, 68*, 229–247.

Waxman, S. R., & Booth, A. (2000). Principles that are invoked in the acquisition of words, but not facts. *Cognition, 77*, B33–B43.

Waxman, S. R., & Markow, D. B. (1995). Words as invitations to form categories: Evidence from 12- to 13-month-old infants. *Cognitive Psychology, 29*, 257–302.

Woodward, A., Markman, E., & Fitzsimmons, C. (1994). Rapid word learning in 13-and 18-month-olds. *Developmental Psychology, 30*, 533–566.