Quick Incidental Verb Learning in 4-Year-Olds: Identification and Generalization

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This study examined the abilities of young children to identify and generalize new verbs from an indirect teaching context. Forty 4-year-olds were shown a story that presented the following manner-of-motion verbs: *frolic, saunter, scurry, strut,* and *trudge*. The experimental group ($N = 20$) heard the label of each verb 13 times while viewing the story, whereas the control group ($N = 20$) did not hear the verbs' labels. The performances of these two groups were compared to each other and to a group of adults ($N = 22$) who did not view the story but presumably had prior knowledge of the verbs. The experimental group correctly identified the target verbs in their prototypical form significantly more often than the control group but less often than the adult group. Generalization measures were evaluated for the children in the experimental group who correctly identified more than half of the target verbs ($N = 6$), their age-matched control group peers ($N = 9$), and the adult group. The experimental subgroup and the adults correctly generalized the verb labels to actions in which unimportant motion features had been altered. However, unlike the adult group, the experimental subgroup responded inconsistently to generalization questions in which important movement features of the actions had been altered. These results suggest that, even in their initial representations of manner-of-motion verbs, young children are sensitive to the relative importance of the different movements that make up these actions.

KEY WORDS: child language development, fast mapping, semantic relations, verb acquisition, word learning

Many studies involving "fast-mapping" or "quick incidental learning" (QUIL) paradigms have demonstrated that young children can learn and remember the phonological form and some of the semantic and syntactic characteristics of words after even a single exposure (e.g., Bedore & Leonard, 2000; Carey & Bartlett, 1978; Dollaghan, 1985, 1987; Oetting, Rice, & Swank, 1995; Rice, Buhr, & Nemeth, 1990; Rice, Oetting, Marquis, Bode, & Pae, 1994; Rice & Woodsmall, 1988). By age 3, all typical children are using these skills to add new verbs to their mental lexicons. Despite these developments, the acquisition of verbs does not appear to be a simple and easy process. For example, in the QUIL studies of Rice and colleagues, young children with typical language development had more difficulty acquiring action words than words from other categories (e.g., objects and attributes). In fact, children under the age of 5 were unable to acquire verbs at response levels greater than chance under the limited exposure conditions of QUIL. These results indicate that young language learners are in a difficult

spot. On the one hand, verbs are important to learn because they play a central role in both semantic and syntactic processing and development. On the other hand, learning new verbs poses considerable difficulty.

Representations following QUIL and fast-mapping tasks are considered to be incomplete (as compared to standard adult definitions). However, relatively few studies have addressed how complete (or incomplete) children's initial representations of newly acquired words are. As a result, very little is known about the scope of what children know when they first learn new words (Crystal, 1998; Rice, 1990). This is especially true with respect to verb acquisition. In this investigation, we used a modified QUIL task to study the ability of 4-year-old children to acquire verbs of locomotion. We were especially interested in gaining insights into what children learn and remember from a limited number of exposures to these verbs.

Verb Learning Through QUIL

QUIL is an elaborated model of fast mapping that was designed to reflect young children's everyday experiences with new words (Rice, 1990). Typically, children view a video with a narrative that introduces new lexical items incidentally. In many ways, the procedures developed for the QUIL task make word learning more difficult than under traditional fast mapping or other word-learning tasks. For example, Rice and colleagues' QUIL studies (a) presented a wide range of potential referents within an ongoing narrative, (b) provided few cues for selecting the correct referent, (c) targeted different types of words (including objects, attributes, actions, and affective states), and (d) mixed all word presentations throughout the narrative.

Word learning under QUIL may also be more difficult than other procedures because it requires children to place new labels onto previously established lexical connections. The QUIL studies were all designed so that the target words could be correctly identified by a word within the participants' vocabularies. Examples of these target-word/familiar-word pairs include *viola–violin* and *trudge–walk*. Acquiring new words in this manner is in opposition to a number of word learning principles, including mutual exclusivity (Markman, 1989; Merriman & Bowman, 1989) and novel name-nameless category (Golinkoff, Hirsh-Pasek, Mervis, Frawley, & Parillo, 1995; Golinkoff, Mervis, & Hirsh-Pasek, 1994). Although there are important differences between these principles (see Golinkoff et al., 1994, for a direct comparison), they both predict that upon hearing a new word, children seek to match the word with a referent for which they have no label. The application of either of these principles to the QUIL tasks would have sent the participants down the wrong path, because all of the target words had synonyms that were presumably within the children's vocabularies.

In sum, learning new words through QUIL requires more mental processing than does learning through fast mapping. As a result, it may be more difficult for children to acquire new words within a QUIL task. Given this, the difficulties that children have been shown to have with acquiring verbs through QUIL may not be too surprising. The reason for this is that verbs carry semantic and syntactic information not found in other grammatical classes. This information includes semantic features, argument structure, thematic roles, and morphosyntactic features of tense, aspect, and agreement. When paired with the cognitive demands of the QUIL task, the processing of these features of verbs may often be too much for young children to handle. In this study, we present a modified version of the QUIL procedure in order to determine if reductions in cognitive demands facilitate verb learning.

Generalizations in Early Lexical Representations

A few researchers have looked beyond word–referent matching to capture some sense of children's representations of recently learned words. These researchers have done this by attempting to define the range of referents to which children are willing to generalize. In one method, the examiner asks for the referent of an unfamiliar word from a response field that includes the fast-mapped word's referent (a label mismatch). Another method requests the fast-mapped word from a field that does not include its referent (a referent mismatch). These methods test the stability of new lexical representations by evaluating children's willingness to generalize the recently learned label and referent to very different forms.

Young children's abilities to reject label mismatches for newly learned objects have been investigated by Golinkoff, Hirsh-Pasek, Bailey, and Wenger (1992) and Wilkinson and McIlvane (1997). Likewise, Golinkoff, Church Jacquet, Hirsh-Pasek, and Nandakumar (1996) examined children's generalizations of action words. The findings from these studies differ in important ways. On the one hand, Golinkoff and colleagues found that children between 2 and 3 years old responded with greater than 60% accuracy to label mismatch questions by selecting a new referent rather than the referent for a recently fast-mapped word. The children's new lexical knowledge appeared rather stable. On the other hand, none of the children under the age of 4 in Wilkinson and McIlvane's study correctly responded to label mismatch questions. Instead, they tended to select the fast-mapped word's referent.

Wilkinson and McIlvane (1997) reported that children have even more difficulty with referent mismatches, as only 2 of their 8 participants answered these items by choosing a "no response" option. The discrepancies in the findings of these studies demonstrate the need for further evaluations of children's initial representations of newly acquired words.

Children's initial word representations following fast mapping also have been evaluated by looking at generalizations to referents that were only slightly different from the original. For example, Golinkoff and colleagues (1992, 1996) requested referents of fast-mapped words that differed from the original, either by color for object words or agent for action words. In both cases, children between 2 and 3 years of age correctly generalized to the new similar referent.

In each of these studies, Golinkoff and colleagues (1992, 1996) selected changes in the referents that, in English, do not often require a change in label. For example, objects typically maintain their labels when their color changes and verbs typically apply to actions regardless of who is performing the action. However, there are changes in referential contexts that are just as subtle as changes in color or agent that often require use of a different label. For example, the verb *run* requires that the agent be moving at a particular speed (i.e., quickly), and the verb *exit* is not appropriate if the agent is not leaving a specific space. These examples show that subtle differences can be critical to a word's representation and that the same feature is not necessarily critical across different words. For example, one can *run* in any direction (in or out of a particular space), and *exit* applies to people who are moving at any speed.

To have a complete understanding of a word, children must learn which features (like speed and direction) are important for defining the word and which features are unimportant for defining a word. Behrend (1990) and Forbes and Farrar (1993, 1995) examined children's generalizations of new verbs to different semantic elements and thematic roles. Among the changes to the target actions were the instrument involved, the causative agent, the direction of the movement, and the continuity of the movement. It is important to note that these studies introduced the target words through direct teaching. This is unlike fast-mapping and QUIL investigations, which present target words through indirect exposure. For example, Forbes and Farrar (1993, p. 278) directly labeled each target action three times while it was shown (e.g., "Watch these people; they are ___ing"). After viewing the target actions and hearing the labels, participants were then shown the alternative actions. The participants were instructed to identify whether the new action was still "___ing" or not. Direct comparisons of the results of these three studies are difficult to make because of the different ages of participants and the variety of elements altered. Two general patterns did emerge. First, both children and adults generalized to some, but not all, types of changes. Second, there appears to be an age-related trend, especially in the Forbes and Farrar studies. Younger children (3-year-olds) tended to accept generalizations of new words less often than did older children (5- and 7-year-olds), who accepted fewer generalizations than did adults.

Taken together, investigations into new-word generalizations have demonstrated that children do not restrict their initial representations of new words to just the prototypical referent. Even after a single exposure to one exemplar, children generalize new object and action labels to referents they have not seen before. At the same time, there does appear to be a limit to their generalizations. It is currently unclear how or why children generalize new word labels to some new referents but not to others.

One reason for this lack of clarity is that all of the studies of children's generalizations have targeted nonsense words. Nonsense words are useful because they control for prior experience with the stimuli. However, nonsense words are problematic for determining the accuracy of generalizations. This is because there is no known range of acceptable generalizations for nonsense words. With no real words as references, it is impossible to tell which generalizations fall within the boundaries of the adult word and which do not. Using an example from Forbes and Farrar (1993), no one can definitively determine if the nonsense label *fluming* still applies when the original action is moving in a different direction or when pauses are included in the motion. Consequently, it is impossible to judge the extent to which children undergeneralize or overgeneralize the meanings of newly acquired nonsense verbs. This investigation directly addressed this problem by targeting real verbs that occur infrequently. In doing so, we hoped to determine the accuracy of children's initial representations by comparing their generalizations to the extensions of adults.

Objectives

This study was designed to (a) examine children's abilities to learn new verbs within a modified QUIL task and (b) investigate the accuracy of children's initial representations. We evaluated two aspects of children's knowledge of locomotion verbs: identification and generalization. A QUIL-like method was selected because it reflects how children are exposed to new words within their daily environments. Also, young children have been found to have particular difficulty with acquiring new verbs within this type of exposure. To facilitate verb acquisition, the QUIL task was modified to reduce the

number of nonlinguistic cognitive demands. Five target verbs with similar semantic and syntactic properties were introduced to a group of 4-year-olds with typical language development. The children's abilities to identify and generalize the target verbs were evaluated through a series of seven comprehension questions. The performance on each of these items by the children who heard the target verbs (i.e., the experimental group) was compared to the performance by two control groups: age - matched peers and adults. Like the control groups in earlier QUIL studies, the age-matched peer group viewed the same exposure stories but did not hear the target words. As a result, they served as a control for possible experiences with the target words, unanticipated patterns of performance bias, and chance responding. The adult control group, unlike the age-matched peers, presumably had prior experience with the target words. The adult group was included to demonstrate the extent to which our stimuli presented (a) acceptable prototypical referents, (b) nonprototypical but acceptable referents (the unimportant manner change items), and (c) related but unacceptable referents (the important manner change items).

Four primary research questions were addressed:

1. Can 4-year-old children with typical language development correctly identify the actions associated with manner-of-motion verbs following limited exposure to the verbs? On the basis of the results of the earlier QUIL studies (Oetting, 1999; Oetting et al., 1995; Rice et al., 1990, 1994; Rice & Woodsmall, 1988) and our efforts to reduce the cognitive demands of the QUIL task, we predicted that the children in the experimental group would correctly identify the target words at rates similar to those of the adults and at rates significantly higher than those of the children in the control group.

2. After limited exposure to a new verb, can 4-year-old children correctly reject associations between target actions and inappropriate novel labels? Similarly, can they reject associations between a novel action that differs in semantically important ways from the target and the newly acquired verb? We predicted that the children in the experimental group would perform with a high degree of accuracy on the label mismatch item, on the basis of the results of earlier studies (Golinkoff et al., 1992, 1996) as well as the relatively high number of exposures to the target verb labels that the children in this study received (i.e., 13 exposures per verb). We anticipated that the experimental group's performance on this item would be significantly more accurate than the age-matched peer group's performance on this item and would be similar to the adult group's performance on this item.

3. Can children correctly generalize recently acquired verb labels to actions in which the manner of motion has been slightly altered in a semantically unimportant way? In other words, will they generalize to similar actions that adults still consider to represent the target label?

4. Can children correctly reject generalizations of recently acquired verb labels to actions in which the manner of motion has been slightly altered in a semantically important way? In other words, will they appropriately refrain from generalizing to similar actions that adults no longer consider to be representative of the spoken label? It was unclear how the children in the experimental group would perform on the items in which the target actions were altered. Forbes and Farrar (1993, 1995) suggested that children generalize action labels to different referents less frequently than adults do. On the basis of this limited evidence, we anticipated that children who presented evidence of learning the target words would generalize the labels to slightly modified actions but that they would do so less consistently than would the group of adults.

Method

Participants

Forty children between 47 and 60 months of age (M = 55 months) participated in this study. This age range was deemed to be most desirable because it falls between the ages of 3 years, at which young children have been shown not to learn verbs based on the limited exposures of a QUIL paradigm, and 5 years, at which children have been shown to have better-than-chance performance learning verbs based on the QUIL paradigm (Oetting et al., 1995; Rice et al., 1990, 1994; Rice & Woodsmall, 1988). In addition, Oetting (1999) observed that 4-year-olds were able to learn verbs under modified QUIL conditions.

The participants were recruited through daycares, preschools, and word-of-mouth contacts throughout the greater Kansas City, MO, and Bowling Green, OH, metropolitan areas. Twenty-three of the child participants were female, and 17 were male. On the basis of parental report, 7 of the children were African American, 19 were European American, 2 were Hispanic, and 1 was Native American. The parents of 10 children selected more than one ethnic category and 1 child's ethnicity was unreported. One child was reported to be a bilingual speaker of English and Spanish, but all others were monolingual English speakers. Each of the children met the following criteria for typical language development: (a) performance within one standard deviation of the mean on the Test of Language Development-Primary second edition (TOLD-P:2; Newcomer & Hammill, 1988), (b) no reported language development difficulties, (c) normal hearing (per 20 dB HL hearing screening; ASHA Panel on Audiologic Assessment, 1997), and (d) no reported neurological or developmental delays.

A total of 22 adults also participated in this study. All of the adult participants were native speakers of Standard American English. They were between 21 and 29 years of age (median = 22 years) and were enrolled in undergraduate courses at the University of Kansas Medical Center. Twenty-one of the adults were female. One of the adults was African American; the others were European American.

Experimental Groups

The children were randomly assigned to either the experimental or control group. For the children in the experimental group, the target words were presented within the context of a story. While viewing the verbs in motion, the children in the experimental group heard the verbs' spoken labels a total of 13 times per verb. Three presentations were live, just before the narrative for the verb began, and 10 presentations were within a prerecorded narrative. During the live presentations, the children viewed the 20 s clip of the target action that was used in the preexperimental labeling task. Live presentations were included because pilot testing of the stimuli suggested that live presentations facilitated verb acquisition and because acquisition was necessary to address questions related to generalization.

The children in the control group viewed the exact same stimuli and heard the same narratives as the children in the experimental group, with a single exception. Instead of hearing the target verbs, the general action words, *go* and *move,* were substituted for the target verbs. The Appendix contains an example of the narratives that each group heard for the target word *strut*. Because the only difference between the two groups of children was the verbal presentation of the verb labels, any differences in group performance can only be attributed to effects of being exposed to the spoken labels.

Target Word Selection and Exposure

Manner-of-motion verbs are verbs of locomotion that not only indicate the movement, but also the manner in which the movement is taking place (Levin, 1993). In other words, manner-of-motion verbs specify the physical conditions of the act being performed. They are especially desirable for studies of the processes of verb acquisition in English-speaking children because motion verbs in English tend to be marked for either manner or cause, unlike motion verbs in other languages that tend to be marked for either direction or the type of object in motion (Talmy, 1985). Thus, manner-of-motion verbs reflect a pattern frequently observed in the native language of the participants. Additionally, the acquisition of these verbs should not be especially difficult for 4-year-old children because they have already had experience with at least some manner-of-motion verbs, such as *walk*, *run*, and *skip*. As a result, targeting manner-of-motion verbs for acquisition expands on a subset of verbs typically within children's repertoires. Manner-of-motion verbs were particularly useful because they are prototypically atelic (i.e., they have no clear endpoint and result in no clear change of state of involved objects), so that the actions could be sustained without completion over time.

The following five manner-of- motion verbs were selected: *frolic*, *saunter*, *scurry*, *strut*, and *trudge*. Hall, Nagy, and Linn's (1984) corpus of over 400,000 spontaneous utterances by 39 preschool children contained no occurrences of any of these verbs. Thus, we did not expect them to be in the participants' existing vocabularies.

The exposure phase of the modified QUIL task was similar to that used by Rice and colleagues. All of the child participants viewed a story that included an audiotaped narrative. The stories used in Rice's QUIL studies were adapted using commercially prepared short cartoons. In contrast, our stories, which were developed specifically for this study, involved two youths as they tried to get to school. The story began with a prologue clip in which the two youths were introduced as they were getting ready to leave for school. The narrative instructed the participants to "watch and listen carefully" because they were going to be asked questions about what they saw. The participants then viewed five vignettes, each of which focused on one of the target actions. The five vignettes were shown to each child in one of three predetermined, randomly assigned orders. Each vignette lasted approximately 100 s, and the target actions were visible at least 70% of the time. The prototypical action for each target verb was shown in a consistent form throughout the entire vignette. A prerecorded audio track described what was happening in the story, without explicitly defining the target action (see the Appendix). The narrations were designed to have an equivalent number of total words (i.e., between 185 and 195 per vignette) and to present each target or general action word 10 times. Five of the presentations were presented in infinitival form (e.g., "He likes to *strut*"), and 5 were presented in third-person singular, present tense contexts (e.g., "He *struts* every day"). The presentation order of these morphosyntactic environments varied across vignettes.

Procedures

The children were seen individually for two sessions lasting between 45 and 60 min. The first session included a hearing screening, standardized language testing,

training and testing on a blank-comparison procedure (described below), and a preexperimental labeling task. The second session included a readministration of the blank-comparison training and testing and the modified QUIL task. For 63% of the children, these sessions occurred within 3 days of each other. All of the children were seen for their second session within 10 days of their first session.

The adults participated in training and testing on the blank-comparison and comprehension testing portion of the modified QUIL task, as did the children. They did not participate in the exposure part of the QUIL task, however, because they were assumed to have had prior contacts with the target verbs through their everyday experiences. As a result, to perform correctly on the comprehension test , the adults in this study had to rely on their knowledge of the target verbs and on the validity of the stimuli. This made it possible to compare what the children learned from the experimental task with what adults tend to already know about the target verbs.

Training and Testing on the Blank-Comparison

The blank-comparison methodology has been used primarily in studies of word learning in children and adults with mental retardation (e.g., McIlvane, Kledaras, Lowry, & Stoddard, 1992; Saunders, Johnston, Tompkins, Dutcher, & Williams, 1997). Children were trained to respond to a black square to represent the response, "the correct picture is hidden behind this black square" or "none of the above." This training was conducted through the Match to Sample Program (Version 11.0.1; Dube & Hiris, 1997). This computer program required the child to identify one item from a field of three familiar pictures (e.g., an apple, a banana, and a dog). Across the 24 trials, an increasingly larger black square was placed over one of the pictures, until one of the three pictures was completely covered. The requested item varied between the hidden object and one of the others. None of the children who participated in this study missed more than 2 of the 24 items.

Because the adults were evaluated in a group setting, the blank-comparison training procedure for them was different. In short, they were verbally instructed to select the black square if an action was requested but not shown. Results from pilot testing demonstrated that adults were able to apply the blank-comparison correctly from this limited instruction.

All of the participants were required to pass a comprehension test after the training on the blank-comparison had been completed. In this task, a series of 10 screens, each of which included three familiar actions (different combinations of *walking*, *skipping*, *marching*, and *hopping*) and a black square, were shown. The actions were shown simultaneously, in motion, for 20 s. The location of the actions and the black square varied across the screens. The participants were asked to point to a spoken action label for each of the screens. In a random order, half of the requests were for one of the familiar actions on the screen and half were for the familiar action not shown. Participants who correctly answered nine or more of the items on this task were included in the study. For the children, this task was readministered during the second session, providing a second chance for children who initially failed to meet the 9 out of 10 criterion. Children who did not correctly identify nine or more items on either the first or second administration were not included in the study.

Preexperimental Labeling

At the end of the first session, a preexperimental labeling task was administered to all of the children. In this task, each of the five target actions was shown in motion for approximately 20 s. Each clip was taken directly from the stories that were to be presented during the second session. Direct requests and questions, such as "Tell me what this boy is doing" and "What's she doing here?" were used to prompt the children to label the actions. The primary purpose of this task was to determine whether the children already had labels for the target actions and, if they did, what those labels were.

Comprehension Testing

Comprehension testing took place immediately after each verb's vignette was completed. The comprehension items required identification from a field of three actions in motion and one blank-comparison, for a total of four possible responses. Figure 1 presents the response fields for the target verb *strut*. The actions were shown simultaneously for approximately 20 s and included different combinations of the target verb, familiar actions, and/or unfamiliar actions. Prototypical examples of the target actions were taken directly from each target verb's vignette. The other actions were all filmed in the same location, at the same time, and with the same agent as the target verb. The familiar verbs were all expected to be within the vocabularies of 4-year-olds, but the unfamiliar verbs were not. The unfamiliar actions included *goose-step*, *lollop*, *mince*, *shuffle,* and *skulk*.

Each of the comprehension questions requested identification of a specific verb. The verbs were all requested within the morphosyntactic environment of third-person singular (see Figure 1 for examples). This is the same morphological structure as at least half of the presentations heard during the exposure narratives (i.e., the other presentations appear in infinitival form with *to*). The morphosyntactic environments were

Figure 1. Examples of the seven comprehension items for the target word *strut*, including the stimulus questions, dimensions changed, and response fields (presented inside the boxes). Unless otherwise stated, the actions shown for each word were shown in a prototypical form. The correct response for each item is indicated by the arrow.

1) **Generalization Item – Label mismatch** **Stimulus – "Which one goose-steps?"**

Target Verb's Action Strut	Familiar Action Tiptoe
Familiar Action Hop	Blank Comparison ⇐

2) **Identification Item** **Stimulus – "Show me struts."**

Blank Comparison	Target Verb's Action Strut ⇐
Unfamiliar Action Goose-step	Familiar Action Hop

3) **Generalization Item – Referent Mismatch** **Stimulus – "Find struts."**

	Unfamiliar Action Goose-step	Familiar Action Hop
⇒	Blank Comparison	Unfamiliar Action Spinning walk

4) **Identification Item** **Stimulus – "Point to struts."**

	Familiar Action Hop	Blank Comparison
⇒	Target Verb's Action Strut	Unfamiliar Action Goose-step

5) **Generalization Item - Unimportant manner** **Stimulus – "Which one struts?"**

Blank Comparison	Target Verb's Action Strut – More knee lift ⇐
Familiar Action Hop – Less knee lift	Unfamiliar Action Goose-step - Less knee lift

6) **Generalization Item - Important manner** **Stimulus – "Point to struts."**

Familiar Action Hop - More arm movement	Blank Comparison ⇐
Target Verb's Action Strut - No arm movement	Unfamiliar Action Goose-step - More arm movement

7) **Generalization Item - Agent's emotion** **Stimulus – "Show me struts."**

Unfamiliar Action Goose-step - Proud	Target Verb's Action Strut – Sad, ashamed
Familiar Action Hop - Proud	Blank Comparison ⇐

matched on the basis of research by Tomasello (see Tomasello, 2000, for a review) and Bedore and Leonard (2000), who found that children identify new verbs more accurately when they are requested within matching environments than when they are requested within environments that differ in exposure and comprehension morphologies.

The comprehension items reflected two different aspects of word knowledge: identification and generalization to other referents. The identification items (see Items 2 and 4 in Figure 1) requested the target verb from a field that included a prototypical model of it, a familiar action, and an unfamiliar action. The label and referent mismatch items (see Items 1 and 3 in Figure 1,

respectively) each addressed generalization by evaluating the strength of the map between the spoken word label and the observed action. The other generalization items (see Items 5–7 in Figure 1) each presented slightly altered forms of the target verb and the other two actions. These items presented changes in an unimportant feature of the movement (i.e., the manner of the motion) (see Item 5 in Figure 1), an important feature of the movement (see Item 6 in Figure 1), and the expressed emotional motivation of the person performing the action (see Item 7 in Figure 1).[1]

The important and unimportant feature generalization items were included to determine the accuracy of children's representations of newly learned verbs as compared to adult interpretations. For this reason, determinations of features that were either important or unimportant to a verb's core meaning were based on pilot testing done with 36 adults. On the basis of these results, the important feature changes were as follows: (a) *frolic* involved a frolic-like movement with no arm movements, (b) *saunter* involved saunter-like movements that were fast rather than slow, (c) *scurry* included scurry-like movements that were slow, (d) *strut* comprised strut-like actions with no arm movement, and (e) *trudge* involved trudge-like movements with long rather than short steps. The unimportant feature changes were as follows: (a) *frolic*, *scurry*, and *strut* were each done in their prototypical forms with the knees lifted higher and (b) *saunter* and *trudge* were each shown with prototypical movements that included more bounce within the steps. Further pilot testing was done with another group of adults to confirm that each of these altered actions was easily recognizable as being different from the prototypical action.

The order of presentation of the seven comprehension items differed across the five target verbs but was not completely random. The order of the first four items shown in Figure 1 was the same across the target verbs. Because the children in the control group were familiar with the target actions from watching the video, they may have been inordinately likely to associate this action with a new word. The result of this selection would be a correct fast mapping of the phonological form to the target action that is based on familiarity and not on acquiring the verbs through incidental learning. In turn, this may have unduly influenced the children's responses to the other comprehension items. To evaluate these possibilities, the label mismatch strength item was presented first. Thus, children who applied a familiarity-based fast map would have mistakenly paired the target verb's referent (e.g., *strut*) with the unfamiliar phonological form (*goose-stepping* in the example of Figure 1), rather than correctly associating the target action to its label. The ordering of Items 2–4 was made so that the two identification items never occurred in sequence. Finally, the three generalization items that presented changes in the target actions were placed last because it was unclear what to make of responses to these items if the prototypical form of the action had not been correctly identified. The order of these last three items varied across each of the target verbs.

[1] The target verbs each carry specific information about the emotional state of the agent of the action. An item that presented an important change in the actor's emotional state was included with each of the target verbs' comprehension questions. Because of technical problems with the presentation of this item, it is not included in this report. Further information regarding this item is available from the authors.

Results

Reliability

Performances on the comprehension task from 10% of the child participants (2 from each group) were randomly selected for rescoring and reentry. A second examiner, blind to the task and the group assignment, viewed videotapes of the 4 children and rescored their responses. Interjudge agreement, calculated by dividing the number of times both examiners recorded the same response by the total number of responses recorded, was .99 (139/140).

Analyses

Preexperimental Labeling

The preexperimental labeling task was administered to 39 of the 40 children. It was accidentally left out of 1 child's protocol. All of the children who participated in this task quickly and easily attempted to label the actions. Only twice was an answer of "I don't know" given. Eighty-seven percent of the children's responses consisted of a locomotion verb that was more general than the target verbs. These included the verbs *walk*, *run*, and *skip*. An additional 5% of labels included one of these general verbs plus a description of a specific part of the action, such as "running and putting her arms up" for *scurry*. Other, less frequent, responses included descriptions of the action without one of the general manner-of-motion verbs (e.g., "waving his arms around") and phrases that included a verb of a different classification type (e.g., "crossing the street").

Target Verb Identification

Acquisition of the target words was measured through two identification trials of each target verb (see Items 2 and 4 of Figure 1). The first identification trial was the second comprehension item presented, following the label mismatch item. The second identification trial was

shown fourth, after the referent mismatch item. The placement of these mismatch items may have had an effect on the participants' responses to the identification trials. A Group (experimental, control, or adult) × Identification Question Item (first or second) repeated measures analysis of variance (ANOVA) was performed to check for such an influence, although only the identification trial and interaction effects were of interest. The dependent variable in this ANOVA was the number of correct responses (out of five) per individual on each of the identification items. No significant differences were found for the order of identification trial, $F(1, 59) = 1.143$, $p = .29$, $\eta^2 = .02$, or the Group × Question interaction, $F(2, 59) = 1.13$, $p = .33$, $\eta^2 = .04$. Thus, the order of the identification trials did not affect performance within any group.

The identification questions were asked to ensure that the participants had correctly mapped the spoken word label to the correct action. However, the probability of a correct response from guessing was one in four. To reduce this probability, a verb was counted as correctly identified only if both identification questions were answered correctly ($p = .06$). The number of verbs identified, ranging from zero to five, was used as the dependent variable in the group identification comparisons.

The target verbs were presented to the children in one of three randomly assigned orders. A Kruskal–Wallis ANOVA was conducted to determine if the order of verb presentation had an effect on the number of verb identifications. This nonparametric procedure was selected because each of the groups showed a nonnormal response distribution. No significant differences were revealed, $H(2) = 0.48$, $p = .785$, suggesting that the order of verb presentation did not influence the children's abilities to consistently identify the target verbs.

Group means and standard deviations for consistent verb identification are displayed in the final column of Table 1. The mean number of consistently identified verbs was 1.75 ($SD = 1.37$) for the experimental group, 0.10 ($SD = 0.31$) for the control group, and 3.27 ($SD = 0.83$) for the adults. There was a significant effect for group status, $H(2) = 42.78$, $p < .001$. Follow-up tests showed that the experimental group identified significantly more target verbs than did the control group, $H(1) = 22.06$, $p < .001$, $d = .43$, but significantly fewer than did the adult group, $H(1) = 13.38$, $p < .001$, $d = .34$.[2] The number of consistent identifications made by the experimental group was significantly correlated with age ($r = .69$, $p = .001$) but not with any other preexperimental variable (including language test performance or background; all other rs ≤ .55, ps ≥ .140).

Table 1 presents the number of participants who consistently identified each individual verb. As shown in the table, not all verbs were equally difficult to identify in our task. For example, there were almost three times more children in the experimental group who consistently identified *scurry* than there were children who identified any of the other verbs (15 of 20 correct identifications for *scurry* and between 4 and 6 of 20 correct identifications for the other verbs). The two children in the control group who identified a target verb got *trudge*. Finally, most adults identified *frolic* and *strut* (22 and 21 out of 22, respectively) but they had more difficulty on *scurry* (15) and *saunter* (12). They had particular difficulty with *trudge*, which only 4 adults correctly identified.[3]

Target Verb Generalization

Because generalizations to other referents are only interpretable if knowledge of the original referent is established, only the generalization data from experimental and adult participants who consistently identified three or more of the target verbs were analyzed.

[2] A nonparametric equivalent of the standardized mean difference (d) was calculated to measure the effect sizes for each two-group post hoc nonparametric analysis. This measure is represented as the mean rank for Group 1 minus the mean rank for Group 2 divided by the standard deviation of the distribution of ranks. The results of these calculations can be interpreted as the standard deviation between group ranks (see Eadie, Fey, Douglas, & Parsons, 2002, for use of the same statistic).

[3] Careful examination of the response patterns revealed that the adults had difficulty deciding between the depiction of *trudge* and the associated unfamiliar verb, *shuffle*. These two choices accounted for 95% of their responses on both of the two identification questions for this verb. A reexamination of the stimuli demonstrated that the actions depicted for *trudge* and *shuffle* were too similar to differentiate adequately. Despite this stimulus problem, *trudge* was maintained as a response item in the analyses related to verb identification for two reasons. First, the children in the experimental group consistently identified *trudge* as often as any of the other verbs, with the exception of *scurry*. Second, even though the adult group's overall performance was reduced by including *trudge*, they still consistently identified the verbs significantly more often than either child group.

Table 1. Total and mean number of consistent identifications of the target verbs for each group.

		Total no. of consistent identifications					No. of consistent identifications	
Group	*N*	*Frolic*	*Saunter*	*Scurry*	*Strut*	*Trudge*	*M*	*SD*
Experimental	20	4	5	15	6	5	1.75	1.37
Control	20	0	0	0	0	2	0.10	0.31
Adult	22	22	12	15	21	4	3.27	0.83

Six of the children in the experimental group and all of the adult participants met this criterion. In addition, we included all children in the control group who were as old as or older than the youngest of the 6 from the experimental group who met the first criterion. Nine participants from the control group met this criterion. To avoid confusion with the larger groups of participants, these two subgroups of children are referred to as the experimental and control subgroups. Because of problems associated with *trudge* (see footnote 3), this item was excluded from all analyses of generalization.

All of the generalization items (see Items 1, 3, 5, and 6 in Figure 1) were analyzed separately because they represent unique aspects of word knowledge. There was an anticipated correct answer for each of these items (as indicated by the arrows in Figure 1). The percentage of participant responses to each of the generalization items is presented in Table 2. The performances of the two subgroups of children and the adult group on the generalization items were compared through a series of Kruskal–Wallis ANOVAs. For each of these ANOVAs, the dependent variable was the number of selections of the anticipated response on all four of the target verbs.

Table 2. Percentage of responses, divided by type, to each of the generalization items.

Question and response type	Group		
	Experimental	Control	Adult
Label Mismatch			
Blank-comparison	29	25	26
Target verb action	4	11	27
Familiar action	25	31	24
2nd familiar action	42	33	22
Referent mismatch			
Blank-comparison	46	28	78
Familiar action	8*	11	1*
Unfamiliar action	38	42	16*
2nd unfamiliar action	8*	19	5*
Unimportant motion change			
Target verb action	71	8*	63
Familiar action	4*	17*	1*
Unfamiliar action	13*	50	9*
Blank-comparison	13*	25	27*
Important motion change			
Blank-comparison	21	36	61
Target verb action	42	17	18*
Familiar action	13	3*	3*
Unfamiliar action	25	44	17*

Note. Asterisks indicate response items that were chosen significantly less often than the most frequent response.

Within-group analyses were made to determine whether any response was selected significantly more frequently than any other responses for each group. These comparisons began with a series of Cochran Q tests for the three groups on each generalization question. Significant results indicated that at least one of the response choices was selected significantly more often than the others. Follow-up McNemar tests were designed, a priori, to investigate the relationship between the item chosen most often and the other three options. As shown by the asterisks in Table 2, the within-group patterns for the experimental and control subgroups varied for each generalization question. With the exception of the label mismatch item, however, the adult group selected the anticipated correct response significantly more often than any other choice ($p \leq .001$ for all tests).

The anticipated response for the label mismatch item was the blank-comparison. The experimental subgroup selected this answer 29% of the time, whereas the control subgroup and adult group selected it 25% and 26% of the time, respectively. The groups did not significantly differ in the number times they picked the anticipated response, $H(2) = 1.33$, $p = .515$. Furthermore, Cochran Q tests revealed that no response type was more common than any other on the label mismatch item for the experimental subgroup, $Q(3) = 7.00$, $p = .072$; the control subgroup, $Q(3) = 4.22$, $p = .238$; or the adult group, $Q(3) = 0.69$, $p = .878$. Thus, this item does not appear to be a valid indicator of the participants' knowledge of the target verbs and will not be analyzed further.

On the referent mismatch item (see Item 3 in Figure 1), the experimental subgroup selected the anticipated response, the blank-comparison, 46% of the time. The control subgroup chose it 28% of the time, and the adult group selected it 78% of the time. The overall comparison between the three groups was significant, $H(2) = 16.40$, $p < .001$. Post hoc testing revealed that the adult group answered the referent mismatch with the blank-comparison significantly more often than did the experimental and control subgroups, $H(1) = 8.35$, $p = .004$, $d = .58$, and $H(1) = 11.93$, $p = .001$, $d = .22$, respectively. The experimental and control subgroups did not differ significantly in their use of the blank-comparison to answer this question, $H(1) = 1.87$, $p = .172$, $d = .36$. Within-group analyses on this item, however, indicated significant response patterns for the experimental subgroup, $Q(3) = 11.00$, $p = .012$, which selected the blank-comparison the most. This was chosen significantly more often than were the familiar and one of the unfamiliar actions ($p = .022$) but not the other unfamiliar action ($p = .824$). The control subgroup did not show a significant response pattern, $Q(3) = 7.33$, $p = .062$. The adults' performance on this item indicates that it was a reasonable

test of the participants' abilities to prevent another action from being associated with the spoken word label. Although the children in the experimental subgroup correctly answered this question almost half of the time, they were just as likely to mistakenly select one of the unfamiliar actions.

The next generalization item presented the verb within a response set that contained the target action modified by what was assumed to be an unimportant manner of motion. The anticipated correct response for this item was the target verb's altered movement (see Item 5 in Figure 1). The percentage of selections of the target verb's altered movement per group was 71% for the experimental subgroup, 8% for the control subgroup, and 63% for the adult group. There was a significant overall group difference, $H(2) = 19.95$, $p < .001$. Follow-up tests revealed that the control subgroup differed significantly from the experimental subgroup, $H(2) = 9.86$, $p = .002$, $d = .83$, and from the adult group, $H(2) = 18.56$, $p < .001$, $d = .65$. The experimental subgroup and the adult group did not differ significantly on this item, $H(2) = 0.74$, $p = .39$, $d = .17$. All three groups demonstrated significant within-group response patterns (Qs ≥ 14.00, ps ≤ .003). The experimental subgroup selected the correct response significantly more often than any other (p ≤ .003). The control subgroup selected the unfamiliar action the most often, significantly more than the target or familiar actions (p ≤ .023) but not more often than the blank-comparison ($p = .124$). These results suggest that for the majority of adults, the changes in motion for these actions were, as planned, too small to require a change in label. Furthermore, children who have only recently learned the target verbs were as likely as adults to generalize the meaning of the verbs to include these small changes in motion from the prototypical targets. In contrast, the control group tended to fast map the new word to the least familiar action shown as a response option.

When the target verb was requested and the response field included what was expected to be an important change to the action's manner of motion (see Item 6 in Figure 1), the experimental subgroup selected the blank-comparison (the anticipated response) on 21% of the trials. The control subgroup picked the blank-comparison on 36% of the trials and the adult group chose it on 61% of the trials. A significant overall group difference in the number of these responses was found, $H(2) = 8.78$, $p = .012$. The adult group selected the blank-comparison significantly more often than did either the experimental, $H(1) = 6.80$, $p = .009$, $d = .54$, or the control subgroup, $H(1) = 3.94$, $p = .047$, $d = .30$. The two subgroups of children did not differ in their selection of the correct blank-comparison item, $H(1) = 0.74$, $p = .390$, $d = .23$. The experimental subgroup did not show a significant response pattern for this item, $Q(3) = 4.33$, $p = .228$. The control subgroup, on the other hand, did demonstrate a significant response pattern for this item, $Q(3) = 15.33$, $p = .002$. They selected the unfamiliar action the most often, at rates similar to the blank-comparison ($p = .710$) and the target verb action ($p = .052$), but significantly more often than the familiar action ($p < .001$). This pattern of results indicates that the adults correctly rejected the important modifications in the actions as exemplars of target or other verbs. In contrast, the children in the experimental subgroup appeared to be unsure of how to respond to these changes, whereas the control group displayed a pattern that may be characterized as a fast-mapping response.

Discussion

Target Verb Identification

The first question addressed by this study evaluated the children's abilities to identify the target verbs. Following exposure through our QUIL task, the children in the experimental group correctly identified the target verbs significantly more often than did the children in the control group. This difference is noteworthy because all of the children viewed the actions of the target verbs an equal number of times and answered the same comprehension questions. Consequently, the performance of the experimental group must reflect appropriate mapping between the spoken form and demonstrated action of the target verb, rather than the familiarity with the items or biases within the response choices.

In Rice and colleagues' QUIL studies (e.g., Oetting et al., 1995; Rice et al., 1990, 1994; Rice & Woodsmall, 1988), 3-year-olds were unable to acquire new verbs at greater-than-chance levels. Like Rice and colleagues' 5-year-olds, our 4-year-olds learned the target verbs at greater-than-chance levels. These results, along with those of Oetting (1999) and the significant correlation we found between age and the number of correct verb identifications, suggest that noticeable improvements in the ability to acquire new verbs through incidental exposure occur between 3 and 4 years of age. This hypothesis should be interpreted cautiously, however, because of the differences in the QUIL procedures used across these studies. For example, our QUIL task may have been easier because we targeted only one type of word and comprehension testing was conducted immediately after each target verb's exposure story was complete.

Although the children in the experimental group identified significantly more of the target verbs than did the children in the control group, they identified significantly fewer of the verbs than did the adults. In fact, the experimental group identified an average of only two verbs per child. If 4-year-olds are able to learn new verbs

through incidental contexts, why did they learn so few in this study? The answer to this question may lie within the current models of lexical acquisition in young children (see Golinkoff et al., 2000, for a review). In general, these models seek to explain how children are able to learn new words incidentally at rapid rates.

One model to consider is Gleitman's (1990) syntactic bootstrapping theory, which proposes that young children use the syntax of the sentence in which a novel word appears as the primary support for determining the word's referent. Like prior QUIL studies, our narratives were designed so that general motion verbs could be appropriately inserted for the target verbs, as shown in the control group's narratives. As a result, the narratives that the children in the experimental group heard did not include specific syntactic information to facilitate mapping the spoken words to the target referents. Likewise, all targets and foils were atelic and intransitive. Thus, many cues that might have been used to contrast different types of verbs were not available in our task. Perhaps these and other types of restricted syntactic information limited the children's abilities to identify the target verbs.

A second group of child word-learning models suggests that children use the information available within the social and pragmatic context of the exposure situation as the primary support for learning new words (e.g., Akhtar & Tomasello, 2000; Bloom, 1993, 2000; Gathercole, 1987, 1989). According to these hypotheses, children are guided to the correct referent for new words by things like the flow of the conversation and the nonverbal referencing done by the child and his or her communication partner(s). It is possible that including these types of cues in our vignettes may have improved the children's performance. However, there is evidence that increased amounts of social and pragmatic cues may not be necessary for successful word learning in children over 18 months of age (Hoff & Naigles, 2002; Oetting, 1999; Rice et al., 1994).

Finally, there are models of lexical acquisition that propose that young children use lexical principles (or constraints) to restrict the number of interpretations that can be made for new words. Two of these principles, mutual exclusivity (Markman, 1989; Merriman & Bowman, 1989) and the novel-name-nameless category (e.g., Golinkoff et al., 1994, 1995), were described in the Verb Learning Through QUIL section above. Although the use of these particular constraints may assist children in the early stages of word learning, the application of such constraints in our task would have rendered the verbs more difficult to learn. This is because the children already had well-known, appropriate labels for the actions of each of the target verbs. Following these principles, the children in the experimental group may have dismissed the target action as the correct referent because a label for that action was already within their vocabularies. As a result, they were left to search for other possible referents. Our narratives provided little direct evidence towards assisting this search. The only evidence the children had available was the syntax of the narrative (which directed them towards an action interpretation but did not provide information to differentiate the target word's referent from that of the more general action label) and the multiple exemplars given throughout the narratives. We are currently investigating the possibility that these constraints had a negative impact on target word acquisition. We are doing so by comparing young children's abilities to learn two different types of new verbs: those with actions that the children can preexperimentally label with an existing, more basic word, and those with actions that the children cannot label.

Target Verb Generalization

Our second question addressed the strength of the connection that was made between the spoken label and its referent. This question was addressed through the label and referent mismatch items. All three groups demonstrated chance-level performances on the label mismatch items, indicating that these items were not valid tests of the participants' word knowledge.

On the referent mismatch items, the children in the experimental subgroup selected the correct response, the blank-comparison, on close to half of the trials. This was significantly more frequent than their responding to two of the other choices, but it was not different from their selections of one of the unfamiliar actions. The unfamiliar action that they chose as often as the blank-comparison was one that had not been included in earlier comprehension items. For example, Item 3 of Figure 1 includes two unfamiliar actions, goose-stepping and a spinning walk. The action of goose-stepping was previously seen as an unfamiliar action in Item 2. This may be important in explaining why one unfamiliar action was chosen more often than the other. The first four comprehension items were always presented in the same order: The first identification item always came before the referent mismatch item. Because the children in the experimental subgroup had correctly answered most of the identification questions, they had experience rejecting the first unfamiliar action (in this case, goose-stepping) as a referent for the verb label. If they carried this applied knowledge to the referent mismatch item, they should have quickly rejected that same unfamiliar action in response to the target label.

The finding that the children in the experimental subgroup selected the blank-comparison so often is

important for two reasons. First, it demonstrates that these 4-year-old participants were not simply avoiding the blank-comparison option. Their failure to use it on other items, then, is not merely a result of response bias. Second, it appears that 4-year-olds are able to prevent an inappropriate action from intruding on the connection between the target verb and its referent, at least part of the time. However, they were considerably less willing to do so than were the adults.

Questions 3 and 4 evaluated the participants' willingness to generalize the spoken word labels that were slightly different from the original referent. Using the adult responses as the gauge of accurate responses, the children in the experimental subgroup generalized appropriately but did not restrict their generalizations correctly. For example, when the target action was modified only slightly, the children in the experimental subgroup tended to accept it as an acceptable referent for the new verb, as did the adults. In contrast, these same children appeared to be unsure of what to do with the spoken label when the actions had been altered in a significant way. Whereas adults fairly consistently rejected the significantly altered actions as exemplars for target verbs and appropriately selected the blank-comparison option, children in the experimental subgroup were equally likely to select any of the options for these items. Part of this lack of certainty may have been related to the changes made to the other actions as well as to the target action. In each of the important motion-change items, the foils shown were altered so that they displayed the feature that was changed in the target verb. For example, the important feature of arm swing was removed from the action shown for *strut* but was added to the familiar and unfamiliar choices. If the children had identified the altered feature as important, they may have been prone to follow that feature to whatever action with which it was placed. This would have made the other two actions more tantalizing choices than they were in the other comprehension questions. Although we cannot test this possibility here, it interesting to consider, because it suggests that young children may be sensitive to the important features of newly learned verbs but are unclear of how these features integrate with other features in defining the verbs.

But how could the children have known which movements were important for defining the target verbs? This question is especially difficult to answer when one considers that by the age of 4 most children already know individual verbs that include arm movement, speed, knee lift, and bounce as important elements. Examples of such verbs include *crawl*, *run*, *march*, and *hop*, respectively. Thus, it is reasonable to surmise that the children considered all four of these semantic elements to be important for defining the target verbs.

It may have been that the changes made to the important movement items (arm movement and speed) were perceptually more salient than the changes to the unimportant movement items (bounce and knee lift). That is, the children may have been willing to accept the actions with insignificant changes in target actions as referents for their newly acquired words simply because they failed to notice the differences in the actions. More noticeable changes in the target actions, as in the items with significant changes in target actions, may have made it significantly less likely for the child to associate the action with the newly acquired word. Pilot testing was done to ensure that both types of changes were different from the prototypical action. We did not compare the important and unimportant feature changes for perceptual saliency, however. Thus, we cannot rule out this possibility.

Another way that the children could have known which movements were important is by using their prior knowledge of motion verbs. Some of these elements of movement may be important for defining more verbs within the lexicons of 4-year-olds than are other elements of movement. For example, if arm movement and speed are used more often as important elements of movement and children are able to exploit this in making assumptions about new verbs, then our results would not be too surprising. This explanation is highly speculative and requires further investigation. At the same time, it is consistent with Hoff and Naigles (2002), who demonstrated that children are highly sensitive to frequency of exposure in word learning.

It is tempting to compare the results of these last two generalization items to those of Behrend (1990) and Forbes and Farrar (1993, 1995). This is because all four studies examined children's generalizations of newly learned verbs to actions that differed by the manner of the motion. Unfortunately, significant differences in the ways that verb generalizations were tested do not allow for a direct comparison. In particular, Behrend and Forbes and Farrar asked the children if a specific new action represented the spoken label. In this study, we asked the children to identify which of four possible options represented the spoken label. These differences make it very difficult to compare results of the three studies. All that can be stated with confidence is that young children do generalize newly learned action words to actions that differ by the manner of the motion, at least some of the time.

Conclusion

In this study, we demonstrated that 4-year-olds can acquire new verbs within indirect learning environments. This finding is significant because no specific

information about the target verbs was included in the narratives that accompanied each verb's presentation. It is just as important, however, that the experimental group did not learn as many of the target verbs as was anticipated. Factors that appeared to have limited their abilities to learn the target verbs were age and preexperimental knowledge of appropriate labels for the actions. In their responses to the generalization items, the children in the experimental subgroup demonstrated sensitivity to the importance of different movements within the action of new verbs. Unlike experienced adults, they were unsure of how to interpret changes to important motions of the target verbs. In future studies, we hope to learn in much greater detail how the conditions present upon children's first exposures to new verbs help them to clarify those verbs' complex meanings.

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References

Akhtar, N., & Tomasello, M. (2000). The social nature of words and word learning. In R. M. Golinkoff, K. Hirsh-Pasek, L. Bloom, L. B. Smith, A. L. Woodward, N. Akhtar, et al. (Eds.), *Becoming a word learner: A debate on lexical acquisition* (pp. 115–135). New York: Oxford University Press.

ASHA Panel on Audiologic Assessment. (1997). *Guidelines for Audiological Screening*. Rockville, MD.

Bedore, L. M., & Leonard, L. B. (2000). The effects of inflectional variation on fast mapping of verbs in English and Spanish. *Journal of Speech, Language, and Hearing Research, 43*, 21–33.

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

Bloom, L. (1993). *The transition from infancy to language: Acquiring the power of expression*. Cambridge, England: Cambridge University Press.

Bloom, L. (2000). The intentionality model. In R. M. Golinkoff, K. Hirsh-Pasek, L. Bloom, L. B. Smith, A. L. Woodward, N. Akhtar, et al. (Eds.), *Becoming a word learner: A debate on lexical acquisition* (pp. 19–50). New York: Oxford University Press.

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

Crystal, D. (1998). Sense: The final frontier. *Child Language Teaching and Therapy*, *14*, 1–27.

Dollaghan, C. A. (1985). Child meets world: "Fast mapping" in preschool children. *Journal of Speech and Hearing Research, 28*, 449–454.

Dollaghan, C. A. (1987). Fast mapping in normal and language-impaired children. *Journal of Speech and Hearing Disorders, 52*, 218–222.

Dube, W. V., & Hiris, E. (1997). Match to Sample Program (Version 11.0.1) [Computer software]. Waltham, MA: E. K. Shriver Center.

Eadie, P. A., Fey, M. E., Douglas, J. M., & Parsons, C. L. (2002). Profiles of grammatical morphology and sentence imitation in children with specific language impairment and Down syndrome. *Journal of Speech, Language, and Hearing Research, 45*, 720–732.

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 verb concepts. *Cognitive Development, 10*, 1–20.

Gathercole, V. C. (1987). The contrastive hypothesis for the acquisition of word meaning: A reconsideration of the theory. *Journal of Child Language, 14*, 493–531.

Gathercole, V. C. (1989). Contrast: A semantic constraint? *Journal of Child Language, 16*, 685–702.

Gleitman, L. (1990). The structural sources of verb meaning. *Language Acquisition, 1*, 3–55.

Golinkoff, R. M., Church 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., Hirsh-Pasek, K., Bailey, L. M., & Wenger, N. R. (1992). Young children and adults use lexical principles to learn new nouns. *Developmental Psychology, 28*, 99–108.

Golinkoff, R. M., Hirsh-Pasek, K., Bloom, L., Smith, L. B., Woodward, A. L., Akhtar, N., et al. (2000). *Becoming a word learner: A debate on lexical acquisition*. New York: Oxford University Press.

Golinkoff, R. M., Hirsh-Pasek, K., Mervis, C. B., Frawley, W. B., & Parillo, M. (1995). Lexical principles can be extended to the acquisition of verbs. In M. T. Tomasello & W. E. Merriman (Eds.), *Beyond names for things* (pp. 185–221). Hillsdale, NJ: Erlbaum.

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.

Hall, W. S., Nagy, W. E., & Linn, R. (1984). *Spoken words: Effects of situation and social group on oral word usage and frequency*. Hillsdale, NJ: Erlbaum.

Hoff, E., & Naigles, L. (2002). How children use input to acquire a lexicon? *Child Development, 73*, 418–433.

Levin, B. (1993). *English verb classes and alternations*. Chicago: The University of Chicago Press.

Markman, E. M. (1989). *Categorization and naming in children: Problems of induction*. Cambridge, MA: MIT Press.

McIlvane, W. J., Kledaras, J. B., Lowry, M. J., & Stoddard, L. T. (1992). Studies of exclusion in individuals with severe mental retardation. *Research in Developmental Disabilities, 13*, 509–532.

Merriman, W. E. & Bowman, L. L. (1989). The mutual exclusivity bias in children's word learning. *Monographs of the Society for Research in Child Development, 54*(3–4, Serial No. 220).

Newcomer, P. L., & Hammill, D. D. (1988). *Test of Language Development-Primary (TOLD-P:2)* (2nd ed). Austin, TX: Pro-Ed.

Oetting, J. B. (1999). Children with SLI use argument structure cues to learn verbs. *Journal of Speech, Language, and Hearing Research, 42*, 1261–1274.

Oetting, J. B., Rice, M., & Swank, L. K. (1995). Quick incidental learning (QUIL) of words by school-aged children with and without SLI. *Journal of Speech and Hearing Research, 38*, 434–445.

Rice, M. (1990). Preschooler's QUIL: Quick incidental learning of words. In G. Conti-Ramsden & C. E. Snow (Eds.), *Children's language* (Vol. 7, pp. 171–195). Hillsdale, NJ: Erlbaum.

Rice, M., Buhr, J. C., & Nemeth, M. (1990). Fast mapping word-learning abilities of language-delayed preschoolers. *Journal of Speech and Hearing Disorders, 55*, 33–42.

Rice, M., Oetting, J. B., Marquis, J., Bode, J., & Pae, S. (1994). Frequency of input effects on word comprehension of children with specific language impairment. *Journal of Speech and Hearing Research, 37*, 106–122.

Rice, M., & Woodsmall, L. (1988). Lessons from television: Children's word learning when viewing. *Child Development, 59*, 420–429.

Saunders, K. J., Johnston, M. D., Tompkins, B. F., Dutcher, D. L., & Williams, D. C. (1997). Generalized identity matching of two-dimensional forms by individuals with moderate to profound mental retardation. *American Journal on Mental Retardation, 102*, 285–291.

Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical forms. In T. Shopen (Ed.), *Language typology and syntactic description. Vol. 3: Grammatical categories and the lexicon* (pp. 57–149). Avon, U.K.: The Bath Press.

Tomasello, M. (2000). Do young children have adult syntactic competence? *Cognition, 74*, 209–253.

Wilkinson, K. M., & McIlvane, W. J. (1997). Blank comparison analysis of emergent symbolic mapping by young children. *Journal of Experimental Child Psychology, 67*, 115–130.

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Appendix. Sample narrative for the target verb *strut* and control verbs *go* and *move*.

There's Anthony. Anthony *struts/goes* across a parking lot. Have you ever had to *strut/go* across a parking lot? Let's watch this story to see how Anthony *struts/goes* to school.

This is a big parking lot. There are a few cars parked here, but it is mostly empty. Anthony has to go across this parking lot to get to school. He starts to *strut/go* across the parking lot. While he *struts/moves*, Anthony keeps an eye out for any moving cars. He will need to *strut/move* for a long time to get all the way across. Anthony *struts/goes* across the yellow lines, when he starts thinking he may be late for school. He *struts/goes* past the blue car and checks his watch. He is a little late, but he may make it to school on time. Anthony continues to *strut/go* across the parking lot. After a while, he *struts/moves* up to some keys that are lying on the ground. They belong to the owner of the second white truck. He picks up the keys and *struts/moves* to the truck. He put the keys on the bumper so that the owner could find them. While he begins to *strut/move* some more, Anthony sees the end of the parking lot. To get there, Anthony has to *strut/go* past a few vans.

Note. The first paragraph was presented live and the second was prerecorded.