Preschoolers’ Use of Form Class Cues in Word Learning

D. Geoffrey Hall, Darryl H. Quantz, and Kelley A. Persoage
University of British Columbia

Three experiments were conducted, involving a total of 180 2½-5-year-old children. The experiments assessed the claim that preschoolers override form class cues in the interest of honoring word-meaning assumptions when they acquire new labels. Children were asked to choose an unlabeled- or a labeled-category object as the referent of a novel word modeled syntactically as a count noun or an adjective (Experiment 1) or as a count noun, adjective, or proper name (Experiments 2 and 3). Participants’ interpretations of the word were also assessed (Experiment 3). Unlike many previous results, results of the present study demonstrate that children respect the form class cues when these cues and word-meaning assumptions suggest conflicting interpretations. It is proposed that past findings underestimate the robustness of form class cues as sources of information for preschoolers about the meanings of new words.

Preschool children can use lexical form class cues to assist them in learning the meanings of words. Evidence to support this claim comes from experimental studies of the acquisition of novel labels. For example, children as young as 2 years of age will extend a novel term (“X”) modeled syntactically as a count noun (e.g., “This is X”) from one object to other objects that share object category membership. At the same age, preschoolers will extend the same novel word presented syntactically as an adjective (e.g., “This is an X one”) from one object to other objects that share a salient property (e.g., color, texture; see Hall & Moore, 1997; Hall, Waxman, & Hurwitz, 1993; Klibanoff & Waxman, in press; Smith, Jones, & Landau, 1992; Waxman & Markow, 1998).

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Correspondence concerning this article should be addressed to D. Geoffrey Hall, Department of Psychology, University of British Columbia, 2136 West Mall, Vancouver, British Columbia, Canada, V6T 1Z4. Electronic mail may be sent to geoff@psych.ubc.ca.

Taylor & Gelman, 1988; Waxman, 1990, 1994; Waxman & Kosowski, 1990; Waxman & Markow, 1998). In addition, same-aged preschoolers will restrict the novel word offered syntactically as a proper name (e.g., “This is X”) to the labeled object (e.g., Hall, 1991, 1996; Hall & Graham, 1999; Jaswal & Markman, 1999; Katz, Baker, & Macnamara, 1974; Liittschwager & Markman, 1993; Macnamara, 1982; Sorrentino, 1999). These results suggest that preschoolers can use knowledge of mappings between particular word categories in their language (e.g., count noun, adjective, and proper name) and specific types of meaning (e.g., object category, object property, and individual object) to assist them in lexical acquisition.

In addition to form class cues, preschoolers’ lexical development appears to be directed by default assumptions about word meaning (see Woodward & Markman, 1998, for a recent review; see also Golinkoff, Mervis, & Hirsh-Pasek, 1994; for critical discussion, see Nelson, 1988). If preschoolers hear a new word for an object for which they do not know an object category label (henceforth, an unlabeled-category object), they often seem to assume that the word denotes the whole object’s category, judging by their extension patterns (see Woodward & Markman, 1998). A number of researchers have interpreted this behavior as supporting the existence of word-meaning assumptions. For example, the behavior may reflect what Markman (1989, 1994) has called the whole object and taxonomic assumptions or what Golinkoff et al. (1994) have dubbed the principles of object scope and categorical scope. In addition, preschoolers seem to assume that a novel term picks out an unlabeled-category object rather than one for which they already know an object category label (henceforth, a labeled-category object), judging by their performance in forced-choice tasks (see Woodward & Markman, 1998). Again, many researchers have viewed this behavior as supporting the operation of word-meaning assumptions. For example, the behavior may reflect the mutual exclusivity assumption, which leads children to avoid mapping a second object category label onto a labeled-category object (e.g., Markman, 1989, 1994; Merriman & Bowman, 1989), or the novel-name–nameless-category principle, which leads chil-
dren to prefer mapping a novel word onto an unlabeled-category object (e.g., Golinkoff et al., 1994).1

What happens when form class cues and word-meaning assumptions suggest conflicting interpretations of a novel word? Consider the situation in which children hear a novel word for an unlabeled-category object and must assign the word a meaning. Word-meaning assumptions (e.g., whole object and taxonomic) dictate that the label names the category to which the whole object belongs (e.g., Markman, 1994). Form class cues do not. For example, if these cues mark the word as an adjective, they indicate that the word names one of the object’s properties; if they mark it as a proper name, they suggest that the word names the individual object. Only if the form class cues mark the word as a count noun do they signal that it names the object’s category, consistent with the word-meaning assumptions. In a number of studies in which this direct-labeling task is used, preschoolers appear to override form class cues when these cues conflict with word-meaning assumptions, because they seem to interpret the label as naming an object category, irrespective of the label’s form class. In some of these studies, children between 2 and 5 years of age have tended to extend the label from an unlabeled-category object to other whole objects of the same object category if the label is modeled syntactically as a count noun (e.g., Landau, Smith, & Jones, 1988; Soja, Carey, & Spelke, 1991). However, in other studies, children have shown the same behavior as if the word were modeled as an adjective or mass noun2 (e.g., Hall et al., 1993; Landau, Smith, & Jones, 1992; Markman & Wachtel, 1988; Smith et al., 1992; see also Dickinson, 1988; Soja, 1992) or a proper name (e.g., Hall, 1991). Details about these other studies are provided in Table 1. In a recent review, Woodward and Markman (1998, p. 395) concluded that “a finding that consistently emerges in these studies is that when form class cues conflict with word learning constraints even preschoolers may ignore them in service of maintaining the constraint.”

The preceding findings are important for understanding lexical development, because they suggest that word-meaning assumptions are more powerful guides to the meanings of novel object words than form class cues, at least for toddlers and preschoolers acquiring English. The results are also surprising, because form class cues are highly reliable guides to word interpretation in the adult language (e.g., Bloom, 1994; Macnamara, 1986). For example, words modeled syntactically as adjectives reliably name properties, not object categories. Words modeled syntactically as proper names reliably label individual objects, not object categories. In fact, even researchers who argue that word-meaning assumptions are important aids to early word learning explicitly recognize that form class cues should, with development, play an increasingly powerful role in directing the interpretation of new words (e.g., Golinkoff et al., 1994; Woodward & Markman, 1998).

Thus, it is noteworthy that the generality of the previous findings has not yet been established, because they have been obtained under a narrow set of conditions—that is, in a single type of word-learning task involving the direct labeling of objects. Research has focused little on whether children will override form class cues in other types of word-learning tasks, such as those in which the mutual exclusivity assumption makes a prediction about behavior.

To investigate the generality of children’s tendency to override form class cues in the interest of honoring word-meaning assumptions, we began by noting that lexical development does not take place only under conditions of ostensive definition, as in the direct-labeling task. Children also typically learn words in many nonostensive contexts, in which they must spontaneously infer both the referent and the meaning of a novel label (e.g., Carey & Bartlett, 1978; Heibeck & Markman, 1987; Liitischwager & Markman, 1993; see Woodward & Markman, 1998, for a review). Consider the situation in which children hear a label in the presence of more than one object, both an unlabeled- and a labeled-

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1 In this article, we describe these behaviors as reflecting Markman’s assumptions, but we recognize that they are also consistent with other proposed principles (e.g., those of Golinkoff et al., 1994).

2 A mass noun is a word (“X”) that labels a substance category and that can appear in sentences like “This is X,” “This is some (more) X,” and “This is made of X.”

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Table 1
Studies in Which Children Have Overridden Form Class Cues That Conflict With Word-Meaning Assumptions

<table>
<thead>
<tr>
<th>Study</th>
<th>Age of participants (in years)</th>
<th>Form class of novel word (“X”)</th>
<th>Appropriate interpretation</th>
<th>Frequently observed interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hall (1991)</td>
<td>2</td>
<td>Proper name/adjective: “This is X”</td>
<td>Individual object/object property</td>
<td>Object category (shape)</td>
</tr>
<tr>
<td>2. Soja (1992)</td>
<td>2</td>
<td>Mass noun: “This is (some [more]) X”</td>
<td>Substance category</td>
<td>Object category (shape)</td>
</tr>
<tr>
<td>3. Hall, Wexman, &amp; Hurwitz (1993)</td>
<td>2 &amp; 4</td>
<td>Adjective: “This is an X one”; “This is a very X-ish one”</td>
<td>Object property</td>
<td>Object category (shape)</td>
</tr>
<tr>
<td>4. Landau, Smith, &amp; Jones (1992)</td>
<td>3</td>
<td>Adjective: “This is an X-y one”</td>
<td>Object property</td>
<td>Object category (shape)</td>
</tr>
<tr>
<td>5. Smith, Jones, &amp; Landau (1992)</td>
<td>3</td>
<td>Adjective: “This is an X one”</td>
<td>Object property</td>
<td>Object category (shape)</td>
</tr>
<tr>
<td>7. Dickinson (1988)</td>
<td>3, 4, &amp; 5</td>
<td>Mass noun: “Here is some X”; “This is made of X”</td>
<td>Substance category</td>
<td>Object category (shape)</td>
</tr>
</tbody>
</table>

Note. These studies involved the direct labeling of a novel object, such as a stuffed animal (Study 1), an artifact (Studies 2, 3, 6, 7), or a geometric shape (Studies 4, 5). All studies except Studies 2 and 7 treated form class as a between-subjects variable.
category object, and they must determine the word's referent and assign the word an interpretation. In this typical indirect-labeling task, word-meaning assumptions make two predictions about performance. First, the mutual exclusivity assumption directs children to map the word to the unlabeled-category object, to avoid attaching a second object category label to the labeled-category object. Second, the whole object and taxonomic assumptions guide children to interpret the word as a category name for the unlabeled-category object. Form class cues do not suggest the same behaviors. First, these cues do not direct children to map the novel word to the unlabeled-category object, because they simply signal a word's general meaning, not how to find its referents. Second, these cues do not generally guide children to interpret the word as naming an object category. As noted earlier, they indicate that the word should be interpreted according to its lexical category. If the cues mark the word as an adjective, they imply the need for an object property interpretation; if they mark it as a proper name, they indicate the requirement for an individual object interpretation. Only if they mark the word as a count noun do the cues indicate that the word names an object category, consistent with the assumptions.

A number of previous studies have examined word learning in this indirect-labeling task, and two results have been obtained consistently. First, children appear to prefer the unlabeled-category object as the referent of the novel word (e.g., Au & Glusman, 1990; Evey & Merriman, 1998; Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992; Graham, Poulin-Dubois, & Baker, 1998; Hutchinson, 1986; Markman & Wachtel, 1988; Merriman & Bowman, 1989; Merriman & Schuster, 1991; Mervis & Bertrand, 1994). This preference for the unlabeled-category object has not been evident if children are asked to choose one of the objects in the absence of a word (e.g., Evey & Merriman, 1998; Markman & Wachtel, 1988; Merriman & Schuster, 1991). Second, children appear to treat the label as a category name for the unlabeled-category object, because they have subsequently extended it from the chosen object to other objects of the same object category (see Golinkoff et al., 1992; Mervis & Bertrand, 1994). Together, these results suggest that children respect word-meaning assumptions (e.g., the mutual exclusivity assumption, as well as the whole object and taxonomic assumptions) when they learn new words in this indirect-labeling task.

Past research has not, however, established that children will override form class cues in order to honor word-meaning assumptions in this task, because previous studies have not used form class cues that conflict with the assumptions. The novel words used in previous research have been modeled as nouns (e.g., “Show me the X”), usually count nouns (e.g., “Show me an X”). The fact that learners map a novel count noun onto an unlabeled-category object suggests that they honor the mutual exclusivity assumption, avoiding a second object category term for a labeled-category object. However, this behavior is also consistent with form class cues, because count nouns are words that label object categories. In addition, the fact that learners extend a count noun to objects of the same object category suggests that they adhere to the whole object and taxonomic assumptions. Again, however, this behavior is also consistent with form class cues, because count nouns actually do label object categories.

In order to assess whether preschoolers override form class cues in the service of honoring word-meaning assumptions in this indirect-labeling task, the form class cues must predict behavior that conflicts with the behavior predicted by the assumptions. This assessment thus requires using novel words that are modeled not as count nouns (e.g., “Show me one that is an X”) but, for example, as adjectives (e.g., “Show me one that is very X”) or proper names (e.g., “Show me one that is named X”). If children override form class cues to honor word-meaning assumptions, then those who hear a novel adjective or proper name should (a) choose the unlabeled-category object as the word’s referent and (b) extend it to other objects of the same object category, just like those who hear a count noun. Such behavior suggests the overriding of form class cues for two reasons. First, the mutual exclusivity assumption directs learners to map a word to the unlabeled-category object to avoid an object category term for a labeled-category object, and neither adjectives nor proper names are object category terms. Second, the whole object and taxonomic assumptions lead them to interpret the word as an object category term, and neither adjectives nor proper names are object category terms. In sum, if children override form class cues to honor word-meaning assumptions in this indirect-labeling task, they should treat a novel adjective or a novel proper name in the same way that they treat a novel count noun.

In three experiments, we manipulated the form class cues that accompanied a novel label in an indirect-labeling task. In Experiment 1, we measured children’s choice of the referent of a novel word modeled syntactically as a count noun or an adjective, given an unlabeled-category and a labeled-category object as options. We also included a control group who chose in the absence of a label. In Experiments 2 and 3, we added a word modeled syntactically as a proper name. In Experiment 3, we also included an extension task to measure children’s interpretation of the novel word. The results of these experiments enabled us to assess the generality of the claim that preschoolers override form class cues in the interest of maintaining word-meaning assumptions (e.g., the mutual exclusivity, whole object, and taxonomic assumptions) when they learn new labels.

Experiment 1

We administered an indirect-labeling task to 4-year-olds assigned randomly to one of three conditions. On each of four test trials, children saw two inanimate objects; one was an unlabeled-category object and the other was a labeled-category object. In the no-word condition, children were asked to choose the one they liked. In the count noun condition, they were asked to pick the one that was the referent of a novel count noun. In the adjective
condition, they were asked to select the one that was the referent of a novel adjective. In the first experiment, the dependent measure was children’s object choice (unlabeled or labeled category).

Method

Participants. The participants were 36 children, ranging in age from 3 years 10 months to 5 years 2 months. Twelve were assigned randomly to each of three conditions: no word (M = 4 years 6 months, SD = 5 months), count noun (M = 4 years 6 months, SD = 6 months), and adjective (M = 4 years 7 months, SD = 4 months). All children were tested individually in their preschools during normal school hours and were from primarily middle-class and upper-middle-class backgrounds. The numbers of boys and girls were roughly the same in each condition. Two additional children failed to complete the procedure, one because of inattention and one because of interference from another child; they were not included in the sample.

Stimuli. The stimuli consisted of eight inanimate objects. Four of these were unlabeled-category objects: a honey dipper, an orange juicer, a plastic flower holder, and a tea-ball. The other four were our labeled-category objects: a ball, a cup, a pencil, and a spoon. We also used a puppet.

We assessed children’s knowledge of a category term for the stimuli by administering a pretest to a separate group of eight 4-year-olds who did not take part in the experiment proper and who were tested under the same general conditions. In the pretest, we included the eight stimuli eventually chosen for the experiment, along with several other potential stimuli: a crayon, an orange peeler, a telephone jack, a truck, a videocassette holder, and a whisk. The experimenter began by telling the children that they were going to see some different things, some of which they probably would recognize and some of which they probably would not. The experimenter asked children to say what the object was if they knew what it was and to say “I don’t know” if they did not. The experimenter then repeated these instructions and asked children to repeat them back aloud. Children then saw all the objects, one at a time, in one of two random orders.

We gave children a score of 1 if they provided any category label (count noun) for the object; they received a score of 0 if they said “I don’t know” or made some related comment. This scoring was conservative because it involved crediting children with knowledge of a count noun for an object even if they provided one that was clearly incorrect. Of the 14 items that we pretested, we chose the 4 with the lowest scores to be our unlabeled-category objects (M = .16, SD = .19), and we chose the 4 with the highest scores to be our labeled-category objects (M = 1.00, SD = .00). It is notable that for the labeled-category objects, the count nouns were all appropriate for the objects.

Procedure. We administered a four-trial forced-choice task, modeled on the task used in Experiment 1 of Markman and Wachtel (1988). Children sat at a table across from the experimenter. The experimenter introduced the puppet. Children heard that they would be playing a short game in which they would first see some things, and then the puppet would ask some questions that would be requests to pick some of the things. The experimenter told the children that there were no right or wrong answers and so whatever they chose would be okay. The experimenter then presented the four pairs of objects, one pair at a time. Each pair consisted of one unlabeled- and one labeled-category object. The specific pairings of unlabeled- and labeled-category objects were counterbalanced across children. All pairs were placed on the table in front of the child, about 30 cm apart. On two trials, the unlabeled-category object was on the left; on the other two trials, it was on the right. The order of the two trials on which the unlabeled-category object appeared on the left was varied across children within a condition but was the same in all conditions. After the experimenter placed each pair on the table, the puppet made a request for children to choose one member of the pair. After children made their choice, the puppet thanked them. Then the experimenter removed the pair and moved on to the next pair. After children made their choice from the fourth pair, the puppet thanked them again, and the experimenter gave them a sticker.

The only variation among the three conditions was in the structure of the sentence frame used in the puppet’s requests. In the no-word condition, the puppet said, “I want the one that you like. Show me the one that you like.” In the count-noun and adjective conditions, the puppet used a novel word (“X”). In the count-noun condition, the puppet said, “I want the one that is an X. Show me the one that is an X.” In the adjective condition, the puppet said, “I want the one that is very X. Show me the one that is very X.” The sentences used in the count noun and adjective conditions differed by only one word (i.e., a or very). In addition, we used a sentence in the no-word condition that was similar in structure to the one used in the two word conditions.

Our novel words were all disyllabic and carried a y suffix. We used words with this suffix in order to ensure that children in both the count noun (e.g., doggy) and the adjective (e.g., furry) conditions would treat the words as plausible members of these categories (and also so that they would be seen as plausible proper names, e.g., Freddy; see Experiments 2 and 3). The words were DAXY, FEPPY, WOGHEY, and ZAVY. We counterbalanced the order in which the words were used on the four trials across participants.

Results

If preschoolers override form class cues in the service of honoring the mutual exclusivity assumption in this task, then they should prefer the unlabeled-category object in both the count noun and the adjective conditions but not in the no-word condition. The results suggested that 4-year-olds did not override form class cues in order to honor the mutual exclusivity assumption.

Table 2. Results of Forced-Choice Task

<table>
<thead>
<tr>
<th>Age and condition</th>
<th>Proportion of unlabeled-category object choices</th>
<th>No. of unlabeled-category object choices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>4-year-olds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count noun</td>
<td>.81***</td>
<td>.22</td>
</tr>
<tr>
<td>Adjective</td>
<td>.63</td>
<td>.27</td>
</tr>
<tr>
<td>No word</td>
<td>.50</td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year-olds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count noun</td>
<td>.79**</td>
<td>.28</td>
</tr>
<tr>
<td>Adjective</td>
<td>.58</td>
<td>.36</td>
</tr>
<tr>
<td>Proper name</td>
<td>.40</td>
<td>.20</td>
</tr>
<tr>
<td>No word</td>
<td>.44</td>
<td>.34</td>
</tr>
<tr>
<td>3-year-olds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count noun</td>
<td>.67</td>
<td>.34</td>
</tr>
<tr>
<td>Adjective</td>
<td>.48</td>
<td>.25</td>
</tr>
<tr>
<td>Proper name</td>
<td>.46</td>
<td>.26</td>
</tr>
<tr>
<td>No word</td>
<td>.38</td>
<td>.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year-olds</td>
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<td></td>
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<td>Count noun</td>
<td>.79**</td>
<td>.26</td>
</tr>
<tr>
<td>Adjective</td>
<td>.43</td>
<td>.32</td>
</tr>
<tr>
<td>Proper name</td>
<td>.38</td>
<td>.27</td>
</tr>
<tr>
<td>No word</td>
<td>.33</td>
<td>.29</td>
</tr>
</tbody>
</table>

Note. n = 12 in all conditions.

* p < .05. ** p < .005. *** p < .0005.
Children's failure to map words to unlabeled-category objects across form classes in this task indicates that their mappings were affected by form class cues, and it is consistent with the possibility that children used these cues appropriately. Specifically, when they interpreted a count noun, children may have preferred the unlabeled-category object because they knew that count nouns name object categories. Thus, children may have invoked the mutual exclusivity assumption, avoiding a second object category label for the labeled-category object. In contrast, when they interpreted an adjective, they may have failed to pick the unlabeled-category object because they knew that adjectives name object properties. Thus, children may have failed to invoke the mutual exclusivity assumption: Both objects had many nameable properties, and therefore children may have been equally likely to attach an object property label to either one. (It is possible, however, that such children still respected an analogue of mutual exclusivity with adjectives, avoiding mapping the property label onto an already-labeled object property; see Footnote 3.) Yet without evidence of how children actually interpreted the novel words, the conclusion that children correctly used the form class cues is premature. In Experiment 3 we return to the issue of children's interpretations of the novel words.

First, however, we report the results of Experiment 2, which was an attempt to replicate and extend the results of Experiment 1. We made three main changes to the method of Experiment 1. First, to broaden the set of form class cues under investigation, we examined children's interpretation of a novel word modeled as a proper name, as well as their interpretation of the word presented as either a count noun or an adjective. (Again, we also included a baseline no-word condition.) The addition of a proper name condition motivated a second change: We switched stimulus objects from inanimates to animate surrogates (i.e., stuffed animals) to address the fact that other research has established that preschoolers tend to assume that proper names should be bestowed specifically upon animate objects (e.g., Gelman & Taylor, 1984; Hall, 1994b; Macnamara, 1982). Third, we included 3-year-olds along with 4-year-olds. A number of studies have found evidence of sensitivity to count noun, adjective, and proper name form class cues even in toddlers (e.g., Gelman & Taylor, 1984; Katz et al., 1974; Taylor & Gelman, 1988; Waxman & Markow, 1998), but some studies have obtained evidence suggesting that children's sensitivity increases over the preschool years (e.g., Gelman & Markman, 1985; Hall et al., 1993; Landau et al., 1988, 1992). Thus, we included 3-year-olds to determine whether younger preschoolers would be more likely than 4-year-olds to override form class cues and respect word-meaning assumptions in this task.

Experiment 2

Experiment 2 was a modified replication of Experiment 1 involving four conditions (count noun, adjective, proper name, and no word) instead of three, animate instead of inanimate stimuli; and 3-year-old participants in addition to 4-year-olds.

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4 We report one-tailed p values for all contrasts because they are directional tests (Rosenthal & Rosnow, 1991).
Method

Participants. Ninety-six children took part: forty-eight 3-year-olds and forty-eight 4-year-olds. None had taken part in Experiment 1. The 3-year-olds ranged in age from 2 years 5 months to 3 years 8 months. Twelve were assigned randomly to each of four conditions: no word (M = 3 years 3 months, SD = 5 months), count noun (M = 3 years 3 months, SD = 5 months), adjective (M = 3 years 4 months, SD = 5 months), and proper name (M = 3 years 3 months, SD = 5 months). The 4-year-olds ranged in age from 3 years 10 months to 4 years 11 months. Twelve were assigned randomly to each of four conditions: no word (M = 4 years 5 months, SD = 4 months), count noun (M = 4 years 6 months, SD = 3 months), adjective (M = 4 years 5 months, SD = 4 months), and proper name (M = 4 years 6 months, SD = 5 months). Children were tested as in Experiment 1 and came from the same populations. The numbers of boys and girls were roughly the same in each condition in each age group.

Stimuli. The stimuli consisted of eight stuffed toys. Four of these were our unlabeled-category objects: They were four novel monsterlike creatures of different kinds. Four of these were our labeled-category objects: a bear, a cat, a dog, and a rabbit. We also used a puppet.

We assessed knowledge of a category label for the stimuli by administering a pretest of the eight stimuli to a separate group of eight 4-year-olds who did not take part in the experiment proper (and had not taken part in Experiment 1). They were tested under the same general conditions. The pretesting involved the same procedure as in Experiment 1 except that we pretested only the eight stuffed toys that were ultimately used in the study. (Previous experience with these toys in other studies enabled us to make an informed choice of items to include as suitable unlabeled- and labeled-category objects.)

As in Experiment 1, children received a score of 1 if they provided a category label (count noun) for the object; they received a score of 0 if they said “I don’t know” or made some related comment. The four unlabeled-category objects were rarely labeled (M = .19, SD = .26), and the four labeled-category objects were almost always labeled (M = .97, SD = .09). It is important to stress that the count nouns children provided for these labeled-category objects were all appropriate.

Procedure. The procedure was the same as that of Experiment 1 for the no-word, count noun, and adjective conditions. The procedure in the proper name condition was identical to that in the three other conditions except that the sentence frame used to introduce the novel label (“X”) was the following: “I want the one that is named X. Show me the one that is named X.” The sentences used to introduce the novel words in the count noun, adjective, and proper name conditions thus differed by only one word (i.e., a, very, or named).

Results

If preschoolers override form class cues to honor the mutual exclusivity assumption in this task, then they should prefer the unlabeled-category object in any word condition (count noun, adjective, or proper name) but not in the no-word condition.

The results were similar to, but clearer than, the results of Experiment 1. Preschoolers did not appear to override form class cues in order to uphold the mutual exclusivity assumption. They appeared to map novel words to the unlabeled-category objects in the count noun condition but not in the adjective, proper name (or no word) conditions. Our first set of analyses focused on the mean proportions of unlabeled-category object choices made by children in each condition. The results are shown in Table 2. We submitted the mean proportions to a two-way ANOVA, with condition (count noun, adjective, proper name, no word) and age (3-year-olds, 4-year-olds) as between-subjects factors. The main effect of condition was significant, F(3, 88) = 6.37, p < .001. The main effect of age was not significant, nor was the effect of its interaction with condition. We computed three planned contrasts on the condition main effect. First, the mean proportion was significantly higher in the count noun condition than in the no-word condition, t(88) = 3.90, p < .0001. Second, the mean proportion was not significantly higher in the adjective condition than in the no-word condition, t(88) = 1.51, p > .05. Third, the mean proportion was not significantly higher in the proper name condition than in the no-word condition, t(88) = 0.24, p > .25. In addition, we found that the mean proportion was significantly higher in the count noun condition than in either the adjective condition, t(88) = 2.39, p < .01, or the proper name condition, t(88) = 3.65, p < .0005.

We next compared the mean proportion of unlabeled-category object choices in each condition within each age group separately with what would be expected by chance (.50). We began by examining the data from 4-year-olds. First, the mean proportion in the count noun condition (M = .79, SD = .28) was significantly greater than chance, t(11) = 3.63, p < .005, but the mean proportion in the no-word condition (M = .44, SD = .34) did not deviate significantly from chance, t(11) = 0.64, p > .50. Second, the mean proportion in the adjective condition (M = .58, SD = .36), like that in the no-word condition, did not deviate significantly from chance, t(11) = 0.80, p > .25. Third, the mean proportion in the proper name condition (M = .40, SD = .20), like that in the no-word condition, also did not differ significantly from chance, t(11) = 1.82, p > .05.

We then examined the data from 3-year-olds. First, the mean proportion in the count noun condition (M = .67, SD = .34) was not significantly greater than chance, t(11) = 1.68, p > .10; in the no-word condition (M = .38, SD = .23), the mean proportion also did not deviate significantly from chance, t(11) = 1.92, p > .05. Second, the mean proportion in the adjective condition (M = .48, SD = .25), like that in the no-word condition, did not differ significantly from chance, t(11) = 0.29, p > .75. Third, the mean proportion in the proper name condition (M = .46, SD = .26), like that in the no-word condition, also did not differ from chance, t(11) = 0.56, p > .50.

Our second set of analyses focused on the consistency of individual children’s responding across trials within each condition and age group. We classified those children who chose the unlabeled-category object on three or four out of four trials as unlabeled-category object choosers (see Table 2). We used the binomial theorem, as in Experiment 1, to calculate whether the number of unlabeled-category object choosers in each condition was significantly different from what would be expected by chance (a = .05). We began by considering the data from 4-year-olds. First, the number of unlabeled-category object choosers in the count noun condition (n = 8) was significantly different from chance, but the number in the no-word condition (n = 3) was not different from what would be expected by chance. The numbers of unlabeled-category object choosers in the adjective condition (n = 5) and the proper name condition (n = 1), like the number in the no-word condition, were not significantly different from what would be expected by chance. The number in the proper name condition was marginally different from, but lower than, what would be expected by chance.) Moreover, the number of unlabeled-category object choosers was significantly higher in the count noun condition than in the no-word condition (p = .05 by a Fisher’s exact test). However, the number of unlabeled-category
object choosers did not differ significantly between the adjective and no-word conditions or between the proper name and no-word conditions (also by Fisher's exact test).

We next considered the data from 3-year-olds. First, the number of unlabeled-category object choosers in the count noun condition (n = 8) was significantly different from chance, but the number in the no-word condition (n = 2) was different from what would be expected by chance. In addition, the numbers of unlabeled-category object choosers in the adjective condition (n = 2) and the proper name condition (n = 2), like the number in the no-word condition, were not significantly different from what would be expected by chance. Furthermore, the number of unlabeled-category object choosers was significantly greater in the count noun condition than in the no-word condition (p < .05 by a Fisher's exact test). However, the number of unlabeled-category object choosers did not differ at all between the adjective and no-word conditions or between the proper name and no-word conditions (no statistics were computed).

Discussion

The results of Experiment 2 replicated and extended the findings from Experiment 1. Neither 4-year-olds nor 3-year-olds appeared to override form class cues in this indirect-labeling task in order to honor the mutual exclusivity assumption. Participants tended to map a novel count noun onto an unlabeled- rather than a labeled-category animate object, consistent with the assumption. However, they did not show such a tendency if the same word was either an adjective or a proper name (or when no word was involved). In fact, the findings of this experiment were even stronger than those of Experiment 1, although it is worth noting that the stimuli in Experiment 1 were all inanimate rather than animate objects.

The 3- and the 4-year-olds performed similarly in all conditions on our task. The only difference that we observed between the age groups was in the proportion of unlabeled-category object choices in the count noun condition. The 4- but not the 3-year-olds in that condition selected the unlabeled-category object at a level that was greater than chance. The similarity of 3- and 4-year-olds' performance suggests that form class cues serve as useful guides to word interpretation for preschoolers of both ages when these cues are pitted against a word-meaning assumption like mutual exclusivity.

Of course, such findings do not rule out the possibility that children's sensitivity to form class cues increases over the course of the toddler and preschool years (cf. Gelman & Markman, 1985; Hall et al., 1993; Landau et al., 1988, 1992), but they do suggest that this sensitivity does not increase appreciably between 3 and 4 years of age.

Children's failure to map a novel word onto an unlabeled-category object across the three form classes confirms the finding from Experiment 1 that preschoolers were affected by the form class cues that accompanied the novel label in this task. It is also again consistent with the possibility that children used these cues appropriately. Specifically, children may have preferred the unlabeled-category object as the referent of a count noun, because they knew that count nouns name object categories. Thus, children may have used the mutual exclusivity assumption, avoiding a second object category term for the labeled-category object. In contrast, children may have failed to choose the unlabeled-category object as the referent of an adjective, because they knew that adjectives name object properties. Thus, they may have failed to use mutual exclusivity: Both objects had many nameable properties, and thus children may have been equally willing to attach an object property label to either one. (It is, however, possible that such children still invoked an analogue of mutual exclusivity with adjectives, avoiding mapping the property term onto an already-labeled object property; see Footnote 3.) Similarly, children may have failed to pick the unlabeled-category object as the referent of a proper name, because they knew that proper names designate individual objects. As a result, they again may have failed to engage mutual exclusivity: Both objects were potential bearers of proper names because both were animate surrogates (Hall, 1994b); children were therefore equally likely to attach an individual object label to either one. (It is unlikely that children invoked an analogue of mutual exclusivity with proper names, because it is unlikely that they knew an individual object label for either object; see Footnote 3.) Yet without evidence of how children actually interpreted the novel words, the conclusion that children correctly used the form class cues remains premature. We address this issue in Experiment 3.

Experiment 3

In Experiment 3, we expanded the design of Experiment 2 to enable an assessment of children's interpretation of the novel words (count nouns, adjectives, or proper names). Immediately after children made their choice of either the unlabeled- or the labeled-category object on each trial of the forced-choice task, we presented them with an extension task. In this extension task, they saw a set of other objects (depending on which object they had chosen in the forced choice) and were asked to extend the novel word. We used children's extension patterns to infer their interpretations of the words. To facilitate the implementation of the extension task, we used object drawings instead of objects. In addition, we focused only on 4-year-olds, given the absence of either a main effect of age or an interaction between age and condition in Experiment 2.

Method

Participants. Forty-eight children took part. They ranged in age from 4 years 0 months to 5 years 3 months. None had taken part in either previous experiment. Twelve were assigned randomly to each of four conditions: no word (M = 4 years 8 months, SD = 4 months), count noun (M = 4 years 8 months, SD = 6 months), adjective (M = 4 years 8 months, SD = 5 months), and proper name (M = 4 years 6 months, SD = 5 months). Children were tested as in the previous experiments and came from the same populations. The numbers of boys and girls were roughly the same in each condition.

Stimuli. There were separate stimuli for the three parts of this experiment. We used a puppet in all parts.

1. Warm-up task stimuli. There were three sets of drawings. The first set contained five drawings: four of milk cartons and one of a cola bottle. The second set contained three drawings of elephants (one large plain one, one medium-sized one with blue and purple crosses, and one small plain one). The third set comprised three drawings of novel creatures of the same kind (one large plain one, one medium-sized one with yellow and green stripes, and one small plain one).

2. Forced-choice task stimuli. These were eight line drawings of animate creatures. Four of them were our unlabeled-category objects: They were four novel creatures, all different from the kind used in the warm-up
task. The other four were our labeled-category objects: a bear, a cat, a dog, and a rabbit. Each of the eight drawings had a unique, multicolored pattern drawn on it with fluorescent markers.

We felt confident that children knew no category label (count noun) for the unlabeled-category objects, because they were invented drawn creatures (unlike the unlabeled-category stimuli in Experiment 2 that were purchased in toy stores and so were potentially known to children). We also felt confident that children did know a category label (count noun) for the labeled-category objects, because they were the same kinds of animals (dog, cat, bear, rabbit) as those used as our labeled-category stimuli in Experiment 2.

3. Extension task stimuli. There were eight sets of drawings: four unlabeled-category object sets and four labeled-category object sets. Each set contained five drawings: (a) the target object (one of the eight drawings used in the forced-choice task); (b) and (c) the category matches (two different members of the same object category as the target, lacking the target's colorful fluorescent property); (d) the property match (a member of a different object category, having the same colorful fluorescent property as the target); and (e) the foil (a member of a different object category, lacking the fluorescent property).

A sample unlabeled-category object set was the following: (a) a monster bearing green and purple stripes; (b and c) two different monsters from the same category as the target, lacking green and purple stripes; (d) a ball with green and purple stripes; and (e) a pencil lacking green and purple stripes. The corresponding labeled-category object set was the following: (a) a dog bearing orange, yellow, and red crosses; (b and c) two different dogs, lacking orange, yellow, and red crosses; (d) a ball with orange, yellow, and red crosses; and (e) a pencil lacking orange, yellow, and red crosses. All the stimulus sets for the forced-choice and extension tasks are listed in Table 3.

Procedure. The procedure had three parts.

1. Warm-up task. The purpose of this task was to familiarize children with the extension task. We had two specific goals. The first was to ensure that children were willing to answer both yes and no on a given trial in that task. To achieve this goal, we gave children a sample trial. We told them that they were going to play a game in which a puppet would ask some questions and that sometimes the answer would be no and sometimes the answer would be yes. We told children to tell the puppet what they thought the answer was, that there were no right or wrong answers, and that it was okay to guess.

We laid out in a random order in front of the child the first set of warm-up stimuli: the four drawings of milk cartons and the one of a cola bottle. For each drawing, we then asked children, "Is this a milk?" Successful performance required children to answer yes (to the four milk cartons) and no (to the cola bottle) within a series of five yes-no questions. Children always answered these questions correctly. Note that we used a mass noun (milk) as our label in order not to bias children's interpretations of the words in the subsequent task, which were count nouns, adjectives, or proper names. In addition, note that there were four yes answers and one no answer, a pattern of responses that did not correspond to any of the patterns of interest in the extension task (see below).

The second goal of the warm-up task was to ensure that children were exposed to all three interpretations of interest (i.e., object category, individual object, and object property) in the extension task. We used the two remaining sets of warm-up stimuli to accomplish this goal: the set of labeled-category objects (elephants) and the set of unlabeled-category objects (novel creatures of a particular kind). Both sets contained a medium-sized object (elephant or creature) bearing a salient fluorescent property, as well as two other plain objects (elephants or creatures), one larger and one smaller. We showed children the three drawings from each set, one set at a time. To draw attention to an object property, we told them that all three things were the same kind of thing. To draw attention to each individual object, we told them that each one was a different individual ("a different one"), even though they were all the same kind of thing. To draw attention to an object category, we told them that the medium-sized one (with the fluorescent property) looked different than the other two (which were plain), thereby highlighting the property. All children in all conditions heard this information.

2. Forced-choice task. As in previous experiments, the goal of this task was to elicit choices of either an unlabeled- or a labeled-category object. The task was identical to the task in Experiment 2, with one exception. After children made their choice on each of the four trials (unlabeled or labeled category), we removed the drawing that children did not choose, and we immediately administered the extension task, using the chosen object.

3. Extension task. The goal of this task was to assess children's interpretation of the novel labels used in the forced-choice task (as well as to assess their interpretations in the control condition). Each trial began with the experimenter's showing children the chosen drawing from the forced-choice task (now the target). We then brought out the appropriate set of extension task drawings. We selected one of these four drawings (determined randomly), and we paired it with the target drawing (to its left or right, determined randomly). We then placed the two drawings in front of the children. We pointed to the nontarget drawing and asked, "Is this one an X?" (count noun condition); "Is this one a very X'?" (adjective condition); "Is this one named X'? (proper name condition); or "Is this one that you like?" (no-word condition). After children answered, we thanked them and removed the nontarget drawing. We then randomly selected each of the three remaining extension task drawings from the set, one at a time, and we repeated the same steps. After removing the fourth nontarget drawing, we asked children the same question of the target drawing. We required a yes or no answer to all five questions.

<table>
<thead>
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<th>Table 3</th>
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<td><strong>Stimulus Sets Used in Experiment 3</strong></td>
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<td>Monster-D</td>
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</table>
Results

Forced choice task. If preschoolers override form class cues in the interest of honoring the mutual exclusivity assumption in this task, then they should prefer the unlabeled-category object in any word condition (count noun, adjective, or proper name), but not in the no-word condition.

The results were very similar to those of Experiment 2. Again, preschoolers did not appear to override form class cues in order to uphold the mutual exclusivity assumption. They consistently mapped the novel term to the unlabeled-category object in the count noun condition, but not in the adjective, proper name (or no word) conditions. Our first set of analyses focused on the mean proportions of unlabeled-category object choices made by children in each condition (see Table 2). We submitted the mean proportions to a one-way ANOVA, with condition (count noun, adjective, proper name, no word) as a between-subjects factor. There was a significant main effect, $F(3, 44) = 6.43, p < .005$. We computed three planned contrasts. First, the mean proportion was significantly higher in the count noun condition than in the no-word condition, $t(44) = 3.92, p < .0005$. Second, the mean proportion was not significantly higher in the adjective condition than in the no-word condition, $t(44) = 0.90, p > .10$. Third, the mean proportion was not significantly higher in the proper name condition than in the no-word condition, $t(44) = 0.37, p > .25$. In addition, we found that the mean proportion was significantly higher in the count noun condition than in either the adjective condition, $t(44) = 3.03, p < .005$, or the proper name condition, $t(44) = 3.57, p < .0005$.

We next compared the mean proportion of unlabeled-category object choices in each condition to what would be expected by chance (.50). First, the mean proportion in the count noun condition ($M = .79, SD = .26$) was significantly greater than chance, $t(11) = 3.92, p < .005$, whereas the mean proportion in the no-word condition ($M = .33, SD = .29$) did not depart significantly from chance. Second, the mean proportion in the adjective condition ($M = .44, SD = .32$), like that in the no-word condition, did not deviate significantly from chance, $t(11) = 0.67, p > .50$. Third, the mean proportion in the proper name condition ($M = .38, SD = .27$), like that in the no-word condition, also did not differ significantly from chance, $t(11) = 1.59, p > .10$.

Our second set of analyses focused on the consistency of individual children's responding across trials within each condition. We classified those children who chose the unlabeled-category object on three or four out of four trials as unlabeled-category object choosers (see Table 2). We used the binomial theorem, as in Experiments 1 and 2, to calculate whether the number of unlabeled-category object choosers in each condition was significantly different from chance ($\alpha = .05$). First, the number of unlabeled-category object choosers in the count noun condition ($n = 9$) was significantly different from chance, but the number of unlabeled-category object choosers in the no-word condition ($n = 2$) was no different from chance. In addition, the numbers of unlabeled-category object choosers in the adjective condition ($n = 3$) and the proper name condition ($n = 2$), like the number in the no-word condition, were not significantly different from chance. In addition, the number of unlabeled-category object choosers was significantly higher in the count noun condition than in the no-word condition ($p < .01$ by a Fisher's exact test). However, the number of unlabeled-category object choosers did not differ significantly between the adjective and no-word conditions or between the proper name and no-word conditions (also by Fisher's exact tests).

As in the previous experiments, children's apparent failure to override form class cues in order to honor the mutual exclusivity assumption in this task suggests that they were influenced by the form class cues that accompanied the novel labels. As discussed earlier, this failure is also consistent with the possibility that children used these cues appropriately. We now turn to evidence that supports this possibility.

Extension task. We began by classifying the set of children's five responses on each trial as reflecting one of four mutually exclusive patterns. The first was an object category pattern, in which children answered yes to the target and the two category matches but no to the two other drawings. The second was an object property pattern, in which children answered yes to the target and the property match but no to the three other drawings. The third was an individual object pattern, in which children answered yes to the target but no to all four other drawings. We called any other pattern of responding an "other" pattern. The probability of showing an object category, object property, or individual object pattern by chance alone was .031 (=.5 x .5 x .5 x .5 x .5). The probability of showing an "other" pattern by chance was .007 (=.10 - .031 - .031 - .031).

If children correctly interpreted the form class cues, then we expected the following results. In the count noun condition, children should have favored an object category pattern. In the adjective condition, they should have shown an object property pattern. In the proper name condition, they should have demonstrated an individual object pattern. Finally, in the no-word condition, they should have shown none of the preceding patterns, revealing instead some other pattern. Recall that evidence that children correctly interpreted the form class cues in the adjective and proper name conditions would also suggest that they overrode the whole object and taxonomic assumptions. The reason is that these assumptions dictate that novel words should be interpreted as naming object categories, especially when they are used to name unlabeled-category objects.

The results indicated that children correctly interpreted the form class cues. We performed two sets of analyses: The first involved between-condition comparisons, and the second involved within-condition comparisons. We began our first set of analyses with an exploration of whether children had a stronger tendency to make each pattern of interpretation in the appropriate condition than in the other conditions. We calculated the mean proportion of the four trials on which children showed each of the four patterns in each condition. These mean proportions appear in Table 4 (the "All trials" column), along with the numbers of participants who contributed to these means (i.e., 12 per condition). We used $t$ tests to compare the mean proportion of trials on which children showed each interpretation pattern in the appropriate condition with the mean proportion in the three other conditions combined. All four tests were significant: The mean proportion of object category patterns was higher in the count noun condition than in the three other conditions, $t(46) = 4.35, p < .0001$; the mean proportion of object property patterns was higher in the adjective condition than in the three other conditions, $t(46) = 5.39, p < .0001$; the mean proportion of individual object patterns was higher in the proper
name condition than in the three other conditions, $t(46) = 4.81$, $p < .0001$; and the mean proportion of "other" patterns was higher in the no-word condition than in the three other conditions, $r(46) = 3.99$, $p < .0005$.

The preceding results were based on proportions computed from all four trials of the forced-choice task, regardless of whether children selected the unlabeled- or labeled-category object. However, recall that the whole object and taxonomic assumptions apply in particular to the interpretation of words for unlabeled-category objects. Thus, we computed the $t$ tests a second time and used proportions based only on those trials of the forced-choice task on which children selected the unlabeled-category object. These mean proportions in each condition appear in Table 4 (the "Unlabeled-category object trials only" column), along with the numbers of participants who contributed. (Some of these numbers appear in Table 5 (the "All trials" column), along with the numbers of participants who contributed (i.e., 12 per condition). We used chi-square tests to compare the number of children who consistently showed each of the four patterns in the appropriate condition to the number in the three other conditions combined. All tests were significant: there were significantly more consistent object category children in the count noun condition than in the three other conditions, $\chi^2(1, N = 48) = 15.67$, $p < .0005$ (corrected for continuity). There were significantly more consistent object property children in the adjective condition than in the three other conditions, $\chi^2(1, N = 48) = 13.17$, $p < .0005$ (corrected for continuity). There were significantly more consistent individual object children in the proper name condition than in the three other conditions, $\chi^2(1, N = 48) = 13.45$, $p < .0005$ (corrected for continuity). Finally, there were significantly more consistent object property children in the adjective condition than in the three other conditions, $\chi^2(1, N = 48) = 13.17$, $p < .0005$ (corrected for continuity). Finally, there were significantly more consistent individual object children in the proper name condition than in the three other conditions, $\chi^2(1, N = 48) = 13.45$, $p < .0005$ (corrected for continuity). Finally, there were significantly more consistent object property children in the adjective condition than in the three other conditions, $\chi^2(1, N = 48) = 13.17$, $p < .0005$ (corrected for continuity). Finally, there were significantly more consistent individual object children in the proper name condition than in the three other conditions, $\chi^2(1, N = 48) = 13.45$, $p < .0005$ (corrected for continuity).

For reasons outlined earlier, we then computed these chi-square tests a second time, using numbers based only on those trials of the forced-choice task on which children selected the unlabeled-category object (see the "Unlabeled-category object trials only" column of Table 5 for these numbers, along with the numbers of participants who contributed). All four tests remained significant:

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*Note.* Words in boldface indicate the appropriate pattern for each condition.
for the consistent object category children, χ²(1, N = 38) = 12.51, p < .0005 (corrected for continuity); for the consistent object property children, χ²(1, N = 38) = 10.38, p < .005 (corrected for continuity); for the consistent individual object children, χ²(1, N = 38) = 7.83, p < .01 (corrected for continuity); and for the consistent other children, χ²(1, N = 38) = 4.33, p < .05 (corrected for continuity).

Our second set of analyses examined whether, within each of the word conditions, children had a stronger tendency to make the appropriate pattern of interpretation than other patterns of interpretation. We focused on the mean proportion of the four trials on which children showed each of the three patterns of primary interest (object category, object property, individual object) within each condition. We used these proportions to compute a contrast score for each child. For children in the count noun condition, these contrast scores reflected the extent to which each child preferred an object category pattern (weight +2) to either of the other patterns (weights −1 and −1). For children in the adjective condition, the contrast scores reflected the extent to which each participant preferred an object property pattern (weight +2) to either of the other patterns (weights −1 and −1). For those in the proper name condition, the scores reflected the extent to which each child preferred an individual object pattern (weight +2) to either of the other patterns (weights −1 and −1). Recall that the likelihood of showing any of these three patterns by chance alone was the same (p = .031). As a result, the mean value of this contrast should have been zero in each condition if children showed no preference for the appropriate pattern over the other two. Thus, using one-sample t tests against a population mean of zero, we tested the significance of the contrast in each condition. In the count noun condition, the contrast was significant, t(11) = 4.34, p < .005; it was also significant in the adjective condition, t(11) = 3.08, p < .05, and it approached significance in the proper name condition, t(11) = 2.15, p < .06.

For reasons discussed earlier, we computed a second contrast score for each child in the same way as in the preceding analyses, but we used proportions based only on those trials of the forced-choice task on which children selected the unlabeled-category object. We obtained the same results that we had found in the analyses involving all trials. Again, the contrast was significant in the count noun condition, t(11) = 4.27, p < .005; it was also significant in the adjective condition, t(8) = 2.04, p < .05, and it approached significance in the proper name condition, t(8) = 2.00, p < .09.

Discussion

The results of Experiment 3, in which object drawings were used instead of real objects, replicated and extended the findings of Experiment 2. In our forced-choice indirect-labeling task, 4-year-olds did not appear to override form class cues in order to honor the mutual exclusivity assumption. Participants mapped a novel count noun onto an unlabeled- rather than a labeled-category animate object, consistent with the word-meaning assumption. However, they did not show such a tendency if they interpreted the same word modeled as either an adjective or a proper name (or when no word was involved).

Children's failure to map a novel word onto an unlabeled-category object across form classes indicates that preschoolers were affected by the form class cues that accompanied the novel label in this task. As explained earlier, it is also consistent with the possibility that children used these cues accurately. And indeed, the results of the extension task confirmed that children did appear to use the form class cues appropriately. They extended a novel count noun to other objects sharing a common salient novel property, and they restricted a novel proper name to the labeled-category object only. (They did not consistently show any of the preceding interpretation patterns when no label was involved.) By demonstrating clear respect for form class cues, these findings support the claim that children did not override form class cues in order to honor the whole object and taxonomic assumptions. They appeared to respect both the cues and the assumptions when they interpreted novel count nouns. When they interpreted novel adjectives or proper names, however, they seemed to respect the cues but not the assumptions (but see Footnote 3).

Taken together, the findings from Experiment 3 suggest that preschoolers exploit word-meaning assumptions (e.g., mutual exclusivity, whole object, taxonomic) to guide their interpretations of new words in an indirect-labeling task, but only when these assumptions do not conflict with the interpretation suggested by form class cues. When the form class cues indicate an interpretation that is consistent with word-meaning assumptions (i.e., in the
interpretation of a novel count noun), children appear to honor both. However, when form class cues signal an interpretation that conflicts with the interpretation indicated by word-meaning assumptions (i.e., in the interpretation of a novel adjective or proper name), children appear to respect the form class cues rather than the word-meaning assumptions. In other words, children seem to place more weight on form class cues than on word-meaning assumptions as guides to interpreting words.

General Discussion

A number of previous findings suggest that when preschool children interpret new words, they override lexical form class cues in the service of maintaining word-meaning assumptions (e.g., Dickinson, 1988; Hall, 1991; Hall et al., 1993; Landau et al., 1992; Markman & Wachtel, 1988; Smith et al., 1992; Soja, 1992). Yet past support for this claim has emerged from tests conducted under conditions in which children have heard the labels applied directly to their referent objects. The current experiments assessed the generality of the claim that preschoolers override form class cues in the interest of honoring word-meaning assumptions by focusing on a situation in which children learn new words indirectly.

In three experiments, we manipulated the form class cues that accompanied a novel label in an indirect-labeling task. In Experiment 1, we gave preschoolers an unlabeled- and a labeled-category object, and we asked them to choose the referent of a novel word modeled syntactically as a count noun or an adjective. We included a control group who selected in the absence of a label. In Experiments 2 and 3, we also examined preschoolers’ choices for a word modeled syntactically as a proper name. In addition, we added an extension task in Experiment 3 to probe for children’s interpretation of the novel word. If children override form class cues in order to honor word-meaning assumptions (as suggested by previous findings), then we expected them to treat words from all form classes like count nouns, mapping them to unlabeled-category objects and extending them to other members of the same object category.

We made two main discoveries. First, in all three experiments, children showed a preference for the unlabeled-category object when they interpreted a novel count noun but not when they interpreted a novel adjective or proper name (or in a control condition involving no label). Such findings suggest that children honor the mutual exclusivity assumption in this task when they interpret a novel count noun but not a novel adjective or proper name. (Of course, these studies do not address, and so do not rule out, the possibility that children honor an analogue of the mutual exclusivity assumption for adjectives or proper names; see Footnote 3.) The results also indicate that preschoolers do attend to form class cues when they interpret novel words, and the findings are consistent with the possibility that they use the cues appropriately. For example, in the task used in these experiments, the mutual exclusivity assumption should direct children to avoid attaching a second object category label to the labeled-category object. As a result, if children respect form class cues, then they should invoke this assumption when they interpret count nouns (which label object categories), but not when they interpret adjectives (which name object properties) or proper names (which name individual objects).

Second, we found in Experiment 3 that children extended a novel count noun beyond the chosen object to other objects of the same object category. In contrast, they extended a novel adjective to other objects sharing a salient property, and they restricted a novel proper name to only the labeled-category object. (They showed none of these extension patterns if no label was used.) Such results are consistent with children’s honoring the whole object and taxonomic assumptions when they interpret a novel count noun but not a novel adjective or proper name. The results also signal an accurate use of the form class cues that accompanied the novel words, because count nouns do label object categories, adjectives do name object properties, and proper names do designate individual objects.

The results of these studies do not support the general claim that preschoolers override form class cues in order to uphold word-meaning assumptions when they interpret novel words. In our indirect-learning task, children did appear to respect word-meaning assumptions when these assumptions were in accord with the interpretations suggested by the form class cues—namely, in the interpretation of novel count nouns. Such findings are consistent with the results of a number of previous studies (e.g., Au & Glusman, 1990; Evey & Merriman, 1998; Golinkoff et al., 1992; Graham et al., 1998; Hutchinson, 1986; Markman & Wachtel, 1988; Merriman & Bowman, 1989; Merriman & Schuster, 1991; Mervis & Bertrand, 1994). In the same task, however, children appeared not to invoke word-meaning assumptions but rather to respect form class cues when the assumptions and the cues suggested conflicting interpretations—namely, in the interpretation of novel adjectives or proper names. These findings are new, and they suggest that preschoolers place greater weight on the information conveyed by form class cues than on word-meaning assumptions when these suggest opposing interpretations. To the extent that preschoolers’ word learning occurs in contexts like those in these experiments, previous findings may underestimate the robustness of form class cues as guides to word interpretation.

What can account for the difference between the current findings and previous demonstrations that children override form class cues in the interest of upholding word-meaning assumptions? One possibility is that the discrepancy stems from one or more differences between the indirect-labeling task (used in these studies) and direct-labeling tasks (used in previous studies). Consider three such differences. First, in our indirect-labeling task, the sentence frame used to present the novel label was imperative (e.g., “Show me one that is an X”); however, in the direct-labeling task, the frame is declarative (e.g., “This is an X”). We know that parents often define new count nouns, especially count nouns that designate unlabeled-category objects, by using declarative sentence frames (e.g., Callanan, 1985; Hall, 1994a; Shipley, Kuhn, & Madden, 1983). Perhaps children acquire an expectation that parents will offer count nouns when they label objects directly, and this expectation promotes the overriding of adjective and proper name form class cues in the direct-labeling task. Second, our indirect-labeling task required children both to locate the word’s referent and to assign a meaning to the word, whereas the direct-labeling task asks children simply to interpret a label for an already-identified referent object. Perhaps the more complex requirements of the indirect-learning task led children to search more actively for clues to the word’s meaning. Thus, children may have made use of form class cues in the indirect task. Third, on each trial...
of our indirect-labeling task, children saw two objects when they heard the novel label; in the direct-labeling task, only one object is present when the label is provided. Perhaps the presence of more than one object at the time of labeling in the indirect task led children to compare them. Such comparisons may have highlighted the distinctiveness of each object’s properties or of each object as an individual. This highlighting may have helped children move away from making an object category interpretation of a novel label presented as an adjective or a proper name in the indirect task.

Of course, it is also possible that the discrepancy between the present results and previous findings does not stem from task differences; instead, it may reflect other differences, such as the particular stimuli chosen or the particular populations tested. In order to isolate the source(s) of the disparity, it is important for future research to undertake direct comparisons of children’s use of form class cues in direct-learning situations and their use of these cues in nonostensive learning situations. Such comparisons will help in the important task of understanding how the context in which children encounter novel words affects what they learn about their meanings.

In conclusion, these experiments suggest that lexical form class cues serve as powerful guides to word meaning for 3- and 4-year-olds. The findings are important for understanding early word learning, because they suggest that default assumptions are not invariably better cues to the interpretation of novel object labels than form class cues. Preschoolers can override the assumptions in at least some word-learning situations in order to respect the cues. These results are sensible from the perspective of the adult language, in which form class cues are highly reliable cues to meaning (see Bloom, 1994; Macnamara, 1986).

It is important to stress, however, that the findings do not imply that word-meaning assumptions play no appreciable role in preschoolers’ word learning. To the contrary, when the word-meaning assumptions made predictions that were consistent with the form class cues, children appeared to honor both (i.e., in the interpretation of novel count nouns). Moreover, word-meaning assumptions may play an even more pervasive role in word learning very early in development, because children cannot rely on form class cues at the outset of language acquisition. After all, form class cues vary from language to language, and so children must learn them in the course of acquiring a lexicon. Some recent evidence suggests that 1-year-olds on the brink of word learning do, in fact, interpret labels from different form classes (count nouns and adjectives) in the same way, consistent with the whole object and taxonomic assumptions (e.g., Waxman, 1994; Waxman & Markow, 1995). Yet evidence that children gain sensitivity to form class cues during the second year of life (e.g., Katz et al., 1974; Waxman & Markow, 1998) highlights a challenging problem now facing researchers: to understand exactly when and how children acquire knowledge of the specific links between words from different form classes and their meanings.

References


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New Editors Appointed: Emotion

The Publications and Communications Board of the American Psychological Association announces the appointment of Richard J. Davidson, PhD (Department of Psychology, University of Wisconsin—Madison), and Klaus R. Scherer, PhD (Department of Psychology, University of Geneva), as co-editors for the new APA journal Emotion for the term 2001–2006.

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Richard J. Davidson, PhD
Emotion Journal Office
Department of Psychology and Waisman Center
University of Wisconsin—Madison
1500 Highland Avenue
Madison, WI 53705-2280