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Four-Year-Olds' Disambiguation of Action and Object Word Reference

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Preschool-age children show a very strong tendency to map a novel noun onto an unfamiliar rather than a familiar object. This so-called disambiguation effect has been interpreted as evidence that youngers expect object labels to be mutually exclusive. In Experiment 1, 4-year-olds were observed to map a novel verb onto an unfamiliar action about twice as often as they mapped it onto a familiar one. When the unfamiliar action had been preexposed, but the familiar one had not, the mapping preference was eliminated. In Experiment 2, 4-year-olds mapped a novel noun onto an unfamiliar object about five times as often as they mapped it onto a familiar object, and this tendency was not affected by preexposure. Even when action embedding and question complexity were controlled, the disambiguation effect was stronger for object than for action words. An account is presented in which two lexical principles, Mutual Exclusivity and Feeling of Novelty, are hypothesized to apply differently to action than to object words. © 1993 Academic Press, Inc.

To learn language, children need to be able to identify the referents of new words. Although external sources of information are often available (e.g., a speaker's gaze, a term's syntax), youngsters may also have an internal source of guidance, namely, the belief that a new term will designate an aspect of the world that cannot already be named rather than one that can.

There is considerable evidence that such an expectation directs the object word learning of people who are at least 2 years old (see Merriman, 1991, for a summary of 12 studies, and Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992, for a recent demonstration) and even some data for it

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being a factor in 1-year-olds' processing (Markman, 1992). When shown a cup and a painter's palette and asked, "Which one is a pilson?", for example, preschoolers nearly always select the novel thing, that is, the palette (Markman & Wachtel, 1988). Merriman and Bowman (1989) called this response tendency the *disambiguation effect* because it functions to resolve ambiguous word reference.

The effect not only indicates how youngsters solve a reference problem that must occur at least occasionally in their lives but also suggests that abstract principles direct word learning. The specific principle(s) have yet to be isolated, however. One proposal (Markman & Wachtel, 1988; Merriman & Bowman, 1989) is that children assume by default, that is, in the absence of explicit evidence, that two words will not refer to the same thing. This Mutual Exclusivity (ME) assumption is maintained by the disambiguation effect because the new noun does not get assigned to the object for which a label is known.

According to the Lexical Gap-Filling (LGF) hypothesis (borrowed from Clark, 1987, by Merriman & Bowman, 1989), youngsters are motivated to find, and thus expect to hear, new words for unfamiliar categories. Selection of the unfamiliar object also satisfies this principle. Golinkoff et al. (1992) have proposed a similar expectation, but call it the Novel-Names-for-Nameless-Categories (N3C) principle; they contend that LGF presupposes Clark's (1987) claim that children believe all words to have unique meanings, but that N3C does not. Although this argument can be debated, we shall refer to the expectation that unfamiliar categopries be called by new names as N3C. ME and N3C can be teased apart experimentally; see Merriman (1991) for a review of phenomena (e.g., label rejection, correction, and restriction) that can be accounted for by ME, but not by N3C.

Our question is whether preschoolers show the disambiguation effect for action words, that is, whether they tend to map novel verbs onto unfamiliar rather than familiar actions. Our purpose is to contribute information about the generality of children's approach to ambiguous word reference and, by implication, the generality of their tendencies to maintain both ME and N3C.

There have been no published studies of whether the ME or N3C principles can be extended to verbs. Moreover, explanations for why these principles are applied to object names do not strictly entail claims about whether they will also govern action words or other kinds of terms. According to Merriman and Bowman (1989), the ME expectation may be acquired from experiences in which new names are introduced in explicit correction of old ones (e.g., "That's not a kitty-cat; that's a fox.") However, the frequency of this kind of input for actions relative to objects is unknown. Another possibility is that ME develops as children detect covariation between name novelty and referent nameability (i.e., as they

note that new words tend to be introduced for aspects of the world that cannot already be named.) Whether this covariation is greater for objects than for actions is also unknown. Finally, Golinkoff et al. (1992) offer no explanation for why children apply N3C to object names.

The disambiguation effect may be more adaptive for object than for action word acquisition. The set of acceptable labels for any particular object tends to be hierarchically organized (e.g., *vehicle–car–Bonneville*), and the basic level term (e.g., *car*) has cognitive primacy (Mervis & Rosch, 1981). If a child does not know basic level labels for all the objects in a set, he or she can fairly safely assume that a new name will be a basic level label for one of the unnameable objects (in the absence of contradictory evidence). If the child does know basic level labels for all the candidate objects, he or she can still assume ME at the subordinate level. Au and Glusman (1990) have documented that preschoolers will map a new name onto a breed of dog that cannot already be named rather than onto a familiar breed, for example, but allow the name to overlap with *dog*.

In contrast, action names have a mostly non-hierarchical structure (Hutenlocher & Lui, 1979) and consequently lack a basic level. Because even a simple action involves several components (e.g., agent, intention, direction, manner of movement, instrument, patient, and result) and may well be part of a coordinated series of actions (e.g., pouring is part of shampooing), several verbs can often be mapped onto it, each emphasizing a different subset of components or a different part of the series. According to Gentner (1982), children find verbs difficult to learn for this very reason: there are too many ways to interpret them. Thus, it is not that safe a bet that a new verb will designate an action that cannot already be named rather than one that can.

For example, the act of chopping off a chicken's head with an ax could be referred to by "_____-s the chicken," with any of the following filling the blank: *murder*; *kill*; *execute*; *abuse*; *attack*; *harm*; *hurt*; *destroy*; *chop(-s) up*; *ax*; *cut*; *decapitate*; *slaughter*; *slice*; *split*; *strike*; *swing(-s) at*; *affect*; *process*; and *prepare*. Although some of these verbs are hierarchically related (e.g., murdering is a kind of killing), most are not (e.g., one can swing at something without cutting it and cut it without swinging at it). Moreover, the pairs that are hierarchically related tend not to be part of the same hierarchy.

A related argument is that noun disambiguation is supported by a bias to map count nouns onto whole objects, rather than parts or properties (Markman & Wachtel, 1988); this tendency keeps the word from being mapped onto an unnamed aspect of a familiar object (e.g., an unfamiliar part). There is no analogous whole action bias for novel verbs; Behrend (1990) has documented great variablility in the components conveyed by the different verbs that preschoolers know (.e.g, *swing*, manner; *clean*,

result; *saw*, instrument). Thus, a child who knows only a result-emphasizing verb for a particular action (e.g., *clean* for someone wiping a countertop) might decide that a novel verb (e.g., *wipe*) emphasizes the manner of this familiar action.

If 4-year-olds are sensitive to the many ways in which several verbs can be extended to the same action, they may not show as strong a disambiguation effect for action words as for object words. They may decide that a new verb is not that much more likely to designate an unfamiliar than a familiar action because the term could very well characterize the latter in a way that differs from how familiar verbs characterize it. On the other hand, ME and/or N3C biases may not diminish in response to experience with verb overlap; youngsters may just find it easier or more natural to think that new words of any kind will map onto novel rather than familiar categories.

EXPERIMENT 1

Merriman and Schuster's (1991) method for assessing object word disambiguation was adapted for action words. Four-year-olds were selected because this age group has shown a very strong tendency to map novel nouns onto unfamiliar rather than familiar objects, even when the latter have more token novelty than the former. The novelty of a token, or individual thing, decreases as experience with it increases. Playing with a palette for 5 min will reduce its token novelty, for example, but may not allow one to assign it to a familiar category (i.e., it may remain a novel kind). Four-year-olds tend to select the familiar token of an unfamiliar kind over the unfamiliar token of a familiar kind as the referent of a new noun, but 2-year-olds tend to do the opposite (Merriman & Bowman, 1989; Merriman & Schuster, 1991). For example, 4-year-olds prefer a palette that they have just played with over a particular cup that they have never seen before as the referent of *glower*, but 2-year-olds do not.

Merriman and Schuster (1991) concluded that 2-year-olds' but not 4-year-olds' adherence to the ME and/or N3C principles is undermined by their attraction to novel tokens. Although 2-year-olds did select objects from unfamiliar categories more often when asked to identify the referent of a novel noun than when merely asked to choose an object (i.e., in response to no word control instructions), indicating that they had some tendency to adhere to the ME and/or N3C principles, 4-year-olds' selections in these two conditions were much more differentiated.

As in Merriman and Schuster's (1991) study, the current study had the additional goals of evaluating the impact of token novelty on the disambiguation effect and of determining whether the tendency to map novel names onto unfamiliar referents is stronger in those who more readily admit name unfamiliarity. Regarding the latter, Merriman and Schuster

(1991) reported that in their own study as well as in an new analysis of data from Merriman and Bowman's (1989) first experiment, 4-year-olds who most often denied knowing the meaning of novel nouns showed the strongest disambiguation effects. That is, children who tended to say "No" when asked, "Do you know what a glower is?", for example, were more likely than those who tended to say "Yes" to map *glower* to an unfamiliar rather than a familiar object. Moreover, in Merriman and Bowman's (1989) fourth experiment, in which the disambiguation effect was at ceiling, the 4-year-olds who most readily acknowledged their ignorance of the test nouns were most likely to justify their mappings of these words by noting the name for the familiar objects. This type of justification implies an ME assumption.

Merriman and Schuster (1991) offered a metacognitive explanation of these findings. To wit, children who are more likely to reflect on their own lexical knowledge are more likely to realize both that a novel name is one they do not know and that a familiar object is one that they can already name. The former realization promotes acknowledgment of name unfamiliarity and both promote the disambiguation effect.

Method

Subjects. Thirty-two 4-year-olds (M = 4-1, range = 4-0 to 4-2), who were located through published birth records and recruited through a mailing with follow-up phone calls, participated. The vast majority were from middle class homes. Equal numbers of boys and girls were assigned to every condition.

Materials. Twelve pairs of videotape were developed. Each tape lasted approximately 10 s and showed a man or woman performing a simple action. The films included sound tracks so that the viewer could hear whatever sound accompanied the action (e.g., crying). The tapes in each pair displayed the same actor, location, and patient (if one was involved in the action), but one presented a familiar action and the other an unfamiliar action. Six pairs portrayed object-focused actions, that is, body movements that had some impact on the same inanimate object or objects (e.g., a man picking up a spoon versus making a spoon catapult across the room.) The other six presented self-focused actions in which the movement had no effect on an object or objects (e.g., a man walking versus repeatedly moving his knees together and apart.) Object- and self-focused action are typically described by transitive and intransitive verbs, respectively. The pairs of films are described in Table 1.

The tapes were selected on the basis of a pilot study in which 18 4-year-olds were asked to name 108 filmed actions. In general, the most frequently named ones were used as the familiars in the experiment and the least frequently named ones were used as the unfamiliars. These

TABLE 1
THE FAMILIAR–UNFAMILIAR ACTION PAIRS IN EXPERIMENT 1

Familiar action	Unfamiliar action
Self-focused	
Man runs back and forth twice	Man whirls forearm in horizontal plane in front of him
Man cries	Man wiggles lips repeatedly
Man sleeps lying down	Man moves legs together and apart repeatedly
Man sits down once	Man repeatedly puffs up one cheek then the other
Woman sings	Woman crosses legs once
Woman jumps up and down repeatedly	Woman leans back while turning in circle twice
Object-focused	
Man washes door with rag	Man repeatedly turns scraper over against door
Man kicks three balls one at a time	Man repeatedly shuffles three balls around on palm
Man picks up spoon once	Man hits down on end of spoon making it catapult off chair
Man opens door once	Man repeatedly rolls fingers on door
Woman drinks orange juice from glass	Woman repeatedly bobs fist in glass of orange juice
Woman cuts paper with scissors	Woman makes several holes in paper with hole puncher

criteria were bypassed in some cases to satisfy two other constraints—that there be six pairs of each type of action focus and that each pair be matched for agent and patient. An action was considered unfamiliar if a child gave no response when asked to name it, labeled it with a non-action word (e.g., "He is sad,"), or used one of the following pro-verbs (see Clark, 1983): *moving*, *going*, *putting*, *making*, and *doing*. The reason for allowing the latter was that every human action, no matter how unfamiliar, can be described with at least one of these terms. For example, a verb phrase of the form, *moving* + BODY PART/OBJECT NAME + DIRECTION NAME, can be applied to every action in Table 1 (.e.g., "moving his knees together and apart.") Also, many actions can be described by *making* + RESULT NAME (e.g., "making holes" for using the hole-puncher.)

Although the decision to classify pro-verb-named actions as unfamiliar can be criticized, objects have a similar problem. Anything can be described as *thing* or *object* or referred to by pro-nouns (hyphenated for emphasis). Also, many of the "unfamiliar" objects that have been used

in disambiguation studies have had familiar superordinate names (e.g., *animal*, *toy*, and *machine*). Knowledge of such names does not undermine the disambiguation effect for objects (Au and Glusman, 1990).

When children in the pilot study were asked to name the 12 unfamiliar actions that were ultimately used in the main study, they either failed to respond or said, "I don't know" on 34% of the trials, produced a non-action word on 6%, applied pro-verbs on 24%, and used specific verbs on 36%. In contrast, they applied specific verbs to the familiar actions on 99% of the trials.

Two preexposure films and two pairs of disambiguation films were created by splicing together the 24 action tapes in various ways. The preexposure films were constructed by randomly dividing the unfamiliar actions into two sets of six, each consisting of three self- and three object-focused actions. Each pair of disambiguation films was made in such a way that when the films were shown simultaneously on separate screens the pairs of unfamiliar and familiar actions listed in Table 1 appeared. The order of the pairs was random. All independent variables (action familiarity, action focus, whether a tape had occurred in a particular preexposure film) were counterbalanced with right-left screen position. One pair of disambiguation films displayed the actions in the reverse order in which they appeared in the other pair.

Procedure. Each child sat across from two color monitors which sat atop two adjacent VCRs on a table in a lab room. The experimenter sat on the floor next to the child and used a remote control to operate the VCRs. Three tasks were administered—preexposure; disambiguation; and naming. For the first task, the child was told to watch one of the preexposure films as it was presented three times on one of the VCRs. This experience was intended to reduce the token novelty of half of the unfamiliar actions that would be presented in the next task. Within each gender × condition cell, half the children viewed one of the preexposure films and half viewed the other.

Instructions for disambiguation varied according to condition. The Novel Word group was told, "I'm going to show you two videos. On one of these TVs you'll see a man jeggering (or whatever the test word was.) Now watch this one." One of the actions from a pair in Table 1 was presented on the left monitor. "Now watch this one." The other action of the pair was presented on the other monitor. "Now I'm going to show you both at the same time." The two actions were presented simultaneously. (The films had been constructed so that each action was duplicated, making rewinding unnecessary.) As the films came on, the child was asked, "Can you point to the one of the man jeggering?" If the actions were object-focused, the request mentioned the patient (e.g., "Can you point to the one of the man jeggering the door?") This method of testing is very similar to one that Golinkoff, Hirsh-Pasek, Cauley, and

Gordon (1987) developed except that novel verbs were used rather than familiar ones and children's pointing gestures were recorded rather than their visual fixations.

The format of the remaining 11 trials was the same except that different action pairs and nonce verbs were used and each trial began with the child being asked whether he or she was familiar with the verb-to-be-tested (e.g., "Do you know what cardling is?") The verbs were *jegger*, *cardle*, *zav*, *glower*, *bruck*, *sart*, *moog*, *biff*, *spain*, *neen*, *clow*, and *firsh*.

The No Word group viewed the films in the same manner, but were not asked to identify the referents of unfamiliar verbs nor to say whether they knew these verbs. During the phase in which two actions were viewed simultaneously, they were told, "I want you to pick one of these. Which one do you think it is?" This condition was included to assess children's preference for one kind of film over another. In both the Novel and No Word conditions, the experimenter accepted whatever selection the child made by saying "OK" or "Good."

The naming task was only given to the Novel Word group. Each child was told, "I was just playing a game with you before. All of those names I asked you about were just pretend names. Now I want to know if you can think of any real names for what the man and the lady were doing." All actions from the disambiguation test were presented one at a time and the child was asked to name each one.

Results and Discussion

Performance on the naming task was used to eliminate, on a child-by-child basis, those disambiguation trials that had not truly pitted a familiar action against an unfamiliar one. Any trial that contained either an unfamiliar action that the child subsequently named by a specific verb or a familiar action that he or she failed to name was dropped from our analyses. The data from two children were completely excluded because they labeled nearly every action. For the remaining participants, an average of 4.1 of the 12 trials was eliminated.

A 2 (Condition: Novel Word vs. No Word) × 2 (Gender) × 2 (Token Novelty of the Unfamiliar Action: High vs. Low) × 2 (Focus: Self vs. Object) mixed analysis of variance, in which the last two factors were repeated measures, of the proportion of disambiguation trials in which an unfamiliar action was selected yielded two significant effects, namely, condition, $F(1, 26) = 11.55$, $p < .005$, and token novelty, $F(1\ 26) = 8.49$, $p < .01$. The relevant cell means are presented in the top section of Table 2.

The effects of condition and token novelty were also significant in an analysis of variance in which items rather than subjects were treated as random factors, $F(1, 11) = 12.67$ and $F(1, 11) = 10.64$, respectively, both $p < .01$.

TABLE 2
PERCENTAGE OF TRIALS IN WHICH AN UNFAMILIAR STIMULUS WAS SELECTED IN EXPERIMENTS 1 AND 2

Experiment/context	Gender	Instruction	Token novelty of unfamiliar action: High	Low
1				
	Girls	Novel word	77	63
		No word	48	42
	Boys	Novel word	76	48
		No word	53	37
2/Action				
	Girls	Novel word	85	92
		No word	32	23
	Boys	Novel word	79	72
		No word	50	54
2/Static				
	Girls	Novel word	93	79
		No word	21	23
	Boys	Novel word	92	90
		No word	33	42

Notes. Because familiar actions were never preexposed, their token novelty was high on all trials.

An unfamiliar action was selected more often by children in the Novel than in the No Word condition (66% versus 45% of the trials, respectively). Moreover, the former group's rate of selecting unfamiliars was significantly greater than chance, $t(13) = 3.19$, $p < .01$. Four-year-olds show the disambiguation effect for both intransitive verbs that designate self-focused actions (67%) and transitive verbs that reference object-focused actions (65%).

To assess whether the disambiguation effect shown by the children in the Novel Word condition was an artifact of experimenter feedback, performance on the very first trial of the test (i.e., before they could receive any feedback) was examined. Sixty-eight percent chose the unfamiliar action on this trial, a figure slightly higher than the one based on all trials (66%), which suggests that the children did not somehow learn to pick unfamiliar actions from experimenter feedback during the test.

Our decision to classify the actions that children described with proverbs in the final naming task (e.g., *moving his arm round and round*) as ones that they could not name is debatable. If children considered these periphrases to be on par with the unmodified specific verbs that they used for the familiar actions, then the disambiguation effect may have been attenuated. Seventeen percent of the disambiguation trials

contained "unfamiliar" actions that the children labeled with pro-verbs on the post-test. When these trials were excluded from our calculations, the disambiguation effect was actually slightly smaller (62% of trials, as opposed to 66%), indicating that our estimate of the strength of this effect was not reduced by including such trials.

In both the Novel and No Word conditions, children were more likely to choose an unfamiliar action that had high token novelty than one that had low token novelty, that is, when it had not been preexposed than when it had (77% vs. 55% of the trials, respectively, in the Novel Word condition and 50% vs. 40% of the trials, respectively, in the No Word condition). Thus, 4-year-olds' tendency to maintain ME between verbs was attenuated by making the token of an unfamiliar action less novel than the token of a familiar action. This manipulation also reduced the tendency of the children in the No Word group to select an unfamiliar action.

The impact of action preexposure was related to how children in the Novel Word group performed on the action-naming posttest. Those who generated the fewest specific verbs for the 24 actions were influenced by token novelty more than those who came up with the most specific verbs, $r(12) = -.58$, $p < .05$. The seven children who generated the fewest verbs selected a novel token of an unfamiliar action in 84% of trials, but selected a preexposed token of one on only 37%. In contrast, the corresponding figures for the remaining seven children were 71 and 72%, respectively. Children with larger verb vocabularies may be less susceptible to token novelty variation than those with smaller ones.

A confound calls the last conclusion into question, however. Those who named more actions in the post-test also had to have more disambiguation trials excluded from analysis ($r(12) = .71$, $p < .05$). Not surprisingly, the number of disambiguation trials excluded was also negatively related to the size of the token novelty effect ($r(12) = -.51$, $p = .06$. Although the two variables were confounded, it is easier to think of reasons why size of verb vocabulary might mediate the impact of token novelty than why number of excluded trials might. For example, children who are better at learning verbs might realize that preexposure to an action has no implications for whether the action is the referent of a new verb.

The youngsters tended to map unfamiliar verbs to unfamiliar actions, but this tendency was weaker than the analogous one that they have shown for object names. In five studies of 4-year-olds (Au & Glusman, 1990, three studies; Merriman & Bowman, 1989, Study 1; Merriman & Schuster, 1991), the average rate of disambiguation for object names on trials in which token novelty did not oppose it was .95; the comparable rate in the current study was only .77. If .95 is taken to be the value of the population mean for object names, then .77 is significantly less than it, $t(13) = 3.18$, $p < .01$. Likewise, the disambiguation rate for trials in

which token novelty opposed it (.55) was much lower than that reported in previous object studies (Merriman & Bowman, 1989, reported rates of .90 or more in three studies, and Merriman & Schuster, 1991, reported a rate of .77). The Novel Word group was more strongly affected by token novelty, their rate having been reduced by 22 points, than the same groups in the noun studies were, where reductions ranged from 4 to 10 points.

When asked whether they knew the unfamiliar verbs (e.g., "Do you know what glarving is?"), six children in the Novel Word group said, "No," on at least 10 of 11 trials, five said, "Yes" on at least 10 of 11 trials, and three responded inconsistently. The two children whose data were excluded also said, "No," on every trial. These proportions are comparable to those obtained for unfamiliar nouns (Merriman & Bowman, 1989, two studies; Merriman & Schuster, 1991). The correlation between number of "No" responses and size of the disambiguation effect was not significant ($r(12) = .32$, $p > .10$). This contrasts with the significant positive correlation found in two object name studies (Merriman & Bowman, 1989; Study 1; Merriman & Schuster, 1991). However, the test of the correlation for verbs has weak statistical power due to its small sample size; in fact, the correlation is not significantly different from the .61 and .65 values obtained in the noun studies. Thus, it is not clear whether 4-year-olds's disambiguation effect and tendency to acknowledge name unfamiliarity are more strongly related for object than for action names.

EXPERIMENT 2

One problem with the conclusion that the disambiguation effect is weaker for actions than for objects is that the first experiment did not directly compare object and action names. Moreover, the investigation differed from previous ones in ways other than the type of word examined. The use of videotapes was unique and the syntax of the disambiguation question (e.g., "Can you point to the one of the men jeggering?") was more complex than that which has been used with nouns (e.g., "Can you point to the jegger?") Also, whereas some children in the first study could have mistakenly mapped test verbs onto objects in the films, those in the object studies could not have made the analogous error of mapping test nouns onto actions because the referents were static.

We developed an object name variant of the procedure used in Experiment 1 in order to determine the source of the weaker disambiguation effect found for action names. In this variant, objects were embedded in an action context and instructions were as syntactically complex as those used in Experiment 1. Results obtained with this procedure were compared to those of Experiment 1 as well as to those obtained with a technique that resembled ones used in previous noun studies. The latter involved static objects and instructions that were worded more simply.

TABLE 3
PAIRS OF FILMS PRESENTED IN THE ACTION CONTEXT/COMPLEX QUESTION CONDITION OF EXPERIMENT 2

	Object pairs	
Action	Unfamiliar	Familiar
Touching	Scraper	Fork
Looking at	Corkscrew	Crayon
Turning	Glasses case	Baby bottle
Patting	Pizza cutter	Book
Showing	Bottle capper	Key
Holding	Food scale	Toy truck
Touching	Ice tongs	Knife
Looking at	Key chain	Ball
Turning	Binder clip	Scissors
Patting	Staple extractor	Spoon
Showing	Turning fork	Pencil
Holding	Hole puncher	Hammer

Method

Subjects. Sixty-four 4-year-olds (M = 4-1, range = 4-0 to 4-2) participated. They were recruited in the same manner as in the first experiment. Equal numbers of boys and girls were assigned to each condition.

Materials. For the Action Context conditions, 12 pairs of videotapes, each of approximately 10 s duration, were developed. Each portrayed a man performing a simple action on an inanimate object. The tapes in each pair displayed the same actor, location, and action, but the object in one was familiar whereas the object in the other was not. The pairs of films are described in Table 3.

The objects were selected from lists of familiar and unfamiliar objects from published reports of noun disambiguation studies (Golinkoff et al., 1992; Markman & Wachtel, 1988; Merriman & Bowman, 1989; Merriman & Schuster, 1991). Actions were selected with the goal of avoiding any that might be associated with the particular familiar objects in the films. For example, one pair depicted a man patting a spoon versus the same man patting a staple extractor.

Twelve pairs of films were also developed for the Static Context conditions. These films contained the same pairs of objects as the films used in the other condition. However, each film presented its object in isolation, that is, with no person in the frame, and thus with no action being performed on the object.

Two preexposure films and two pairs of disambiguation films that were structured similarly to the ones used in Experiment 1 were created. The counterbalancing schemes from that study were used again.

Procedure. The procedure was the same as in the previous experiment, except for the changes that were needed to convert it from a study of action words to one of object words. Equal numbers of children were assigned to four conditions, which differed according to the videotapes presented and to whether the instructions used for the disambiguation task involved novel terms. For the disambiguation test, the Action Context–Word group was told, "I'm going to show you two videos. On one of these TV's you'll see a man patting a jegger (or whatever the action and nonce word were.) Do you know what a jegger is? Now watch this one." One of the films from a pair in Table 3 was presented on the left monitor. "Now watch this one." The other film of the pair was presented on the other monitor. "Now I'm going to show you both at the same time." The two films were presented simultaneously, and the child was asked, "Can you point to the one of the man patting the jegger?" On the naming post-test, a question that mentioned the actions on the objects was used to solicit labels for every object that had been presented in the disambiguation task (e.g., "Can you tell me what the man is patting?")

The disambiguation and naming instructions for the Static Context–Word condition were the same as for the other condition, except no mention of persons or actions was made since films of static objects were presented. For example, the instructions for one disambiguation trial was, "Can you point to the jegger?" and for all naming trials, "What is that?"

The remaining two groups were No Word control conditions, one of which viewed the Action Context disambiguation videotapes and the other, the Static Context tapes. The instructions during the disambiguation phase were the same for the two control groups, "I want to pick one of these. Which one do you think it is?"

Results and Discussion

Disambiguation of object name reference. As in the analysis of the first experiment, performance on the naming task was used to discard disambiguation trials that had not truly presented a choice between a familiar and an unfamiliar object. Any trial that contained either an unfamiliar object that the child labeled on the post-test or a familiar object that he or she failed to label was dropped. An average of 2.25 of 12 trials was eliminated.

A 2 (Context: Action vs. Static) × 2 (Instruction: Novel vs. No Word) × 2 (Gender) × 2 (Token Novelty of the Unfamiliar Object: High vs. Low) mixed analysis of variance, in which the last factor was a repeated measure of the proportion of disambiguation trials in which an unfamiliar object was selected yielded two significant effects, namely, instruction, $F(1, 56) = 106.83$, $p < .0001$, and instruction × gender, $F(1, 56) = 6.29$, $p < .05$. The relevant cell means are presented in the bottom two-thirds of Table 2.

Children who were asked to point out the referents of novel nouns chose objects that they could not already name over ones that they could on .85 of the trials, a rate significantly greater than chance, $p < .001$. The corresponding rate for the No Word control groups was .34. The selections of the Novel Word group were not significantly affected by either context or token novelty. The substantial disambiguation effect and the nonsignificant effect of token novelty (4 points) are comparable in size to those obtained in previous studies of 4-year-olds' mapping of novel object names (Au & Glusman, 1990, 3 studies; Merriman & Bowman, 1989; Merriman & Schuster, 1991). For example, children's rate of selecting novel tokens of unfamiliar objects in the Static Context condition (.92) is very close to the average rate of the previous studies that used this context (.95). Thus, effects are not appreciably altered by mode of referent presentation, that is, by whether stimuli are pictures, objects, or videotapes.

Simple effects tests indicated that the source of the instruction × gender interaction was the No Word condition. In the Novel Word condition, boys selected unfamiliar objects nearly as often as girls did (83% vs. 87% of trials, respectively); in the No Word condition, however, boys choose such objects more often than girls did (45% vs. 27%, respectively). Why, when they were simply asked to select an object, only the girls preferred ones that they could name over ones that were unfamiliar is not obvious. Of more importance is our finding that the object name disambiguation effect did not vary according to gender.

The nonsignificant effect of context suggests that children's tendency to map new nouns onto new kinds of objects was not substantially reduced by embedding objects in an action context or by using a syntactically complex test question. Even when the data from the No Word condition are dropped from the analysis of variance, neither the context nor context × token novelty effects are significant ($ps > .10$).

Comparison of action and object name disambiguation. Because there were no significant effects or interactions involving the context variable, the data from the Action and Static conditions of the current study were combined and compared to the data from Experiment 1. A 2 (Experiment: 1 vs. 2) × 2 (Gender) × 2 (Instruction: Novel vs. No Word) × 2 (Token Novelty) mixed analysis of variance of the proportion of trials in which children selected the stimulus that they could not already name yielded significant effects of instruction, $F(1, 86) = 72.75$, $p < .0001$, and token novelty, $F(1, 86) = 10.84$, $p < .005$. Three significant interactions were obtained, experiment × instruction, $F(1, 86) = 12.40$, $p < .001$, experiment × token novelty, $F(1, 86) = 7.05$, $p < .01$, and gender × instruction, $F(1, 86) = 3.98$, $p < .05$.

Consistent with our comparison of the action results of the first study to previously published results for objects, the disambiguation effect was

found to be smaller for actions than for objects. In Experiment 1, children in the Novel and No Word conditions selected the unfamiliar stimulus on 66 and 45% of trials, respectively; these respective percentages in Experiment 2 were 85 and 34%. Simple effects tests indicated that the difference between the Novel Word conditions of the two experiments were significant, $F(1, 86) = 9.62$, $p < .005$, but the difference between the No Word conditions was not, $F(1, 86) = 3.32$, $p > .05$.

As predicted, the tendency to select unfamiliar stimuli was significantly reduced by preexposure in the case of actions, but not in the case of objects. The children chose preexposed and non-preexposed unfamiliar actions on 77 and 55% of trials, respectively. The corresponding figures for unfamiliar objects were 87 and 83%, respectively.

Although the gender × instruction interaction was significant, it only accounted for 4% of the variance. Gender differences in the No Word condition were largely responsible. In the Novel Word condition, boys and girls selected unfamiliar stimuli on 73 and 79% of trials, respectively, $F(1, 86) = 1.05$, $p > .10$, whereas in the No Word condition, the corresponding percentages were 34 and 45, respectively, $F(1, 86) = 3.34$, $p = .07$.

Acknowledgement of novel name unfamiliarity. When children in the Static Context condition of Experiment 2 were asked whether they knew the unfamiliar nouns (e.g., "Do you know what a jegger is?"), eight said "No," on at least 11 of 12 trials, four said, "Yes," on at least 11 of 12 trials, and four responded inconsistently. In the Action Context condition, these response patterns were shown by 8, 3, and 5 children, respectively. These distributions are comparable to both those found for the unfamiliar verbs in Experiment 1 and those reported in past noun studies (Merriman & Bowman, 1989; Merriman & Schuster, 1991).

The correlation between number of "No" responses and size of the disambiguation effect was significant in the Action Context condition ($r(14) = .43$, $p < .05$, one-tailed), but not in the Static Context condition ($r(14) = .10$, $p > .10$). Given the small sample sizes, not too much should be made of the inconsistency of the correlations; the difference between the two r values is not significant ($Z = .92$, $p > .10$). Combining the Z-transformed r values of this experiment with those obtained in two other noun studies, ($r = .65$ in Merriman & Schuster, 1991, and $r = .61$ in Merriman & Bowman, 1989, Experiment 1) yields an average r of .47, which is not too different from the r value of .32 obtained for the verbs in Experiment 1, and is not statistically different from it.

GENERAL DISCUSSION

Main Findings

In Experiment 1, 4-year-olds showed the disambiguation effect for verbs; they were more likely to map a novel term onto an action that

they could not already name rather than onto one that they could. For example, when asked to select the woman who was "glarving," they pointed to someone who was leaning back while turning in a circle more often than to a person who was doing what they called "jumping." This mapping tendency was as strong for intransitive verbs that referenced self-focused behaviors (e.g., moving one's knees together and apart) as for transitive verbs that designated actions that affected objects (e.g., punching holes in a piece of paper.)

A comparison of the results of Experiment 1 to those of both Experiment 2 and previous studies (Au & Glusman, 1991; Merriman & Bowman, 1989; Merriman & Schuster, 1991) indicated that 4-year-olds' disambiguation effect is weaker for action than for object words. The rate at which unfamiliar rather than familiar actions were identified as the referents of novel verbs in Experiment 1 was less than the analogous rate for the novel nouns in Experiment 2. Moreover, unlike the disambiguation effect for nouns, the effect for verbs did not withstand opposition from token novelty; children in Experiment 1 did not select preexposed unfamiliar actions significantly more often than non-preexposed familiar actions. Finally, the strong noun disambiguation effect manifest in the Action Context condition of Experiment 2 was evidence that the noun-verb difference is not an artifact of factors such as the physical context of referents or the syntactic complexity of test questions.

A Two-Factor Account

Theoretical treatments of the ME and N3C principles provide little basis for predicting the nature of the disambiguation effect for action words. We will sketch a two-factor explanation of this effect that is both speculative and incomplete; it is primarily intended as a framework for further research.

The first factor is a hypothesized weaker ME bias for action than for object words. Because of the mostly nonhierarchical structure of action words (Huttenlocher & Lui, 1979) and the many ways in which the components of an action can be packaged by different verbs (Gentner, 1982), children learn that in situations in which no explicit information about the relation between two verbs is received (i.e., default situations) new verbs are only somewhat more likely to be used for actions that cannot be named than for ones that can be named. In contrast, they learn that the differential likelihood of these two kinds of uses of a novel noun is much greater. Development of this noun–verb differentiation may also be supported by the more frequent occurrence of explicit contrastive input for object than for action words. That is, children may be told thinks like "That's not a chicken; that's a turkey" more often than they are told things like "He's not walking; he's running."

A second factor is needed to explain why token preexposure works

against the disambiguation effect, and why this countervalence is stronger for actions than for objects. We propose that children abide by a Feeling of Novelty (FN) principle, an expectation that novel words will designate physical entities that feel new rather than familiar. Unfamiliar stimuli tend to be experienced as more novel than familiar ones, and so as children hear new words introduced for the former more often than the latter, they develop the FN expectation along with ME. The latter directs name mapping based on whether a label is already known for a potential referent (as does N3C), whereas FN directs it based on a simple emotional response.

The feeling of novelty that something evokes depends on both its type and token novelty. When the latter is held constant, unfamiliar types (i.e., stimuli that cannot be given specific names) should feel more novel than familiar, nameable types. Thus, FN generates the disambiguation effect in situations in which token novelty is not manipulated, just as ME and N3C do. However, FN implies several predictions that the other lexical principles do not. When type novelty is held constant (e.g., when two stimuli are either both nameable or both unnameable), a new name should be assigned to the more novel token (see Merriman & Bowman, 1989, Experiment 1, for positive evidence.) Also, when the token of an unfamiliar type is preexposed and the token of a familiar type is not, FN implies that the disambiguation effect should be reduced and possibly reversed.

The results of Experiment 1 suggest that FN controlled the action word mapping of approximately half of the 4-year-olds, whereas ME governed that of the others. The selections of the former group were strongly influenced by token novelty, whereas those of the other children were not affected by it at all. The youngsters who disregarded token novelty also tended to have larger verb vocabularies than the ones who were swayed by it.

In Experiment 2, as well as in previous studies of object disambiguation, token novelty had little impact on any child. There are at least two ways of handling this result theoretically. First, those who rely on FN for action words may switch to ME for object words. A child may need to have a certain amount of experience with the words in a particular semantic domain (e.g., action words) before learning that new labels tend to designate unnameable rather than nameable members of that domain. Because action words are learned more slowly than object words (Gentner, 1982), and because the covariation between referent nameability and name novelty may be stronger for objects than actions, the switch to ME may occur later for actions.

This last proposal is supported by two findings: the strong impact of token novelty on 2-year-olds' object disambiguation (Merriman & Bowman, 1989; Merriman & Schuster, 1991) and the negative correlation in

Experiment 1 between the number of actions 4-year-olds' could name and their sensitivity to token novelty. Because of their limited experience, 2-year-olds should rely on FN in all domains. Four-year-olds who have larger verb vocabularies than their agemates may have had more opportunity to detect covariation between action nameability and verb novelty.

An alternative hypothesis is that 4-year-olds who rely on FN in action word mapping also use it to direct their selection of object word referents, but type novelty is a much larger component than token novelty of how novel an object feels than it is of how novel an action feels. This claim implies that a group that is guided by FN should show a larger disambiguation effect for objects, as well as one less affected by token novelty.

New types of action may not strike children as much more novel than familiar types. Because there are only so many body parts and so many ways of moving them, and because youngsters are quite familiar with the ways their bodies can move, no movement may seem that new. They may well have performed some of the unnameable actions from Experiment 1 themselves before (e.g., puffing up one cheek then the other), or have seen others perform them. In contrast, there are innumerable potential object parts and ways of combining them into an object; in fact, any object could be used as a component of a larger thing. Moreover, children may find many parts and configurations to be foreign.

Future research could decide between these alternatives by examining intercorrelations between the token novelty effects for nouns and verbs; if these were strong, the second alternative would be supported. Also, the second alternative implies that attention and memory phenomena that are known to be affected by item distinctiveness (e.g., the von Restorf effect, release from proactive interference) would be stronger for unfamiliar types of objects than for unfamiliar types of actions.

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