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Object Properties and Object Kind: Twenty-One-Month-Old Infants' Extension of Novel Adjectives

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Three experiments examined the conditions under which infants acquiring English succeed in mapping novel adjectives, applied ostensively to individual objects, to other objects with the same property (color or texture). Twenty-one-month-old infants were introduced to a target (e.g., a yellow object) and asked to choose between (1) a matching test object (e.g., a different yellow object) and (2) a contrasting test object (e.g., a green object). Infants hearing the target labeled with novel adjectives were more likely than those hearing no novel words to choose the matching test object. Infants also revealed an emerging distinction between novel adjectives and nouns. Finally, infants' expectation regarding the extension of adjectives appears to unfold within the support of a familiar basic-level category. Infants extended novel adjectives to the matching test object when all objects were all drawn from the same basic level category; they failed to do so when the objects were drawn from different basic level categories.

INTRODUCTION

Recent research regarding the relation between language and conceptual organization has contributed to the view that language serves as a catalyst for the acquisition of particular types of concepts in the first few years of life (Brown, 1958; Gleitman, Gleitman, Landau, & Wanner, 1986; Katz, Baker, & Macnamara, 1974; Landau & Gleitman, 1985; Markman, 1994; Waxman, 1994). It is now apparent that by 2 or 3 years of age, children (like adults) focus on different aspects of objects and events, depending upon how these are described. For example, preschool-aged children expect that a count noun, applied ostensively to an individual object (e.g., "This is a *dax*"), will refer to that object and to other members of the same basic and superordinate level object categories (Markman & Hutchinson, 1984; Soja, Carey, & Spelke, 1991; Waxman & Gelman, 1986; Waxman & Hall, 1993; Waxman & Kosowski, 1990). In contrast, they expect that a novel adjective, applied ostensively to that same individual object (e.g., "This is a *dax* one") will refer to a property of the named object (e.g., color, texture, size) or to a distinct subordinate level object category (Gelman & Markman, 1985; Hall & Moore, 1997; Prasada, 1997; Taylor & Gelman, 1988; Waxman, 1990). Results like these indicate that preschoolers are sensitive to the syntactic distinctions between count nouns and adjectives and that children expect words from these two distinct syntactic categories to have different types of meaning. Yet because these results are based primarily on preschoolers, they cannot reveal when these expectations emerge over the course of development.

To address this developmental issue, several recent investigations have centered attention on the emergence of these linkages between the linguistic and the conceptual in infants and toddlers. Most of this work has examined the emergence of the linkage between count nouns and object categories. The results suggest that the noun-category linkage is evident by 12 months of age (Balaban & Waxman, 1996, 1997; Waxman, 1995; Waxman & Hall, 1993; Waxman & Markow, 1995) and may be evident across human languages (Gleitman, 1990; Maratsos, 1991; Pinker, 1994; Waxman, 1994; Waxman & Markow, 1995). Considerably less attention has been devoted to the emergence of a linkage between adjectives and their associated meanings, but there are indications that this emerges later in development and varies according to the particular language under acquisition (Dixon, 1982, 1994; Waxman, Senghas, & Benveniste, 1997; Wierzbicka, 1986).

In this article, we focus on the emerging relation between adjectives and properties of objects in infants acquiring English. Our goal is to identify the circumstances under which young learners of English succeed in extending a novel adjective, applied ostensively to an individual object, to other objects sharing a salient property with that individual. To address this issue, we adopted a simple procedure, introducing infants to a target object (e.g., a yellow object) and asking them to choose between two test objects. The matching test object shared a salient property with the target (e.g., another yellow object); the contrasting test object contrasted with the target

along that dimension (e.g., a green object). If infants can identify adjectives in the input and if they expect that adjectives refer to properties of objects, then infants hearing the target labeled with a novel adjective (e.g., "This is a(n) *X* one") should reveal a preference for the test object's sharing the property with the target.

To maximize the possibility of detecting this emerging relation between adjectives and object properties, we sought to satisfy several criteria. First, we selected 21-month-old infants as participants because most infants at this age (1) have acquired productive vocabularies of at least 50 words, (2) have acquired at least a few words describing object properties (i.e., words that would be classified as adjectives by adult speakers of English), and (3) have begun to produce at least a few multiword utterances. These developmental milestones suggest that the ability to map words to object properties may begin to emerge at about 21 months of age.

Second, it was essential that we provide infants with cues that would permit them to identify a novel word as an adjective. Notice that in English, both adjectives ("This is *red*") and count nouns ("This is an *apple*") can be applied ostensively to individual objects. There are, however, syntactic and semantic distinctions between these two grammatical categories. (See, e.g., Kester, 1994, for a syntactic analysis and Wierzbicka, 1986, for a semantic analysis.) By 2½ years of age, children acquiring English are sensitive to (at least some of) the syntactic distinctions and reveal different types of expectations for words introduced as adjectives versus count nouns (Gelman & Markman, 1985; Hall, Waxman, & Hurwitz, 1993; Waxman, 1990, 1995; Waxman & Kosowski, 1990). In the current experiments, our strategy was to capitalize on these distinctions, taking care to select syntactic frames that occur typically in infant-directed speech and that provide sufficient evidence for the intended syntactic assignment of the novel word. We presented novel words either as adjectives (e.g., "This is a(n) *X* one. This one is *X*") or as count nouns (e.g., "This is a(n) *X*. This one is a(n) *X*"). We then examined infants' extensions of these words to the test objects. We anticipated that 21-month-olds would be sensitive to these particular syntactic cues for adjectives and count nouns (Waxman, Stote, & Philippe, 1997). Thus, this strategy permitted us (1) to assess infants' ability to use syntactic cues to identify members of the grammatical category *adjective* and (2) to examine infants' expectations regarding the extension of novel adjectives. This strategy takes advantage of both the syntactic as well as semantic distinctions between adjectives and count nouns in English.

Third, we presented objects whose basic level labels are familiar to most 21-month-olds. This is important because the familiarity of a named object has consequences for children's interpretation of a novel word (Hall et al., 1993; Markman & Wachtel, 1988; Taylor & Gelman, 1988; Waxman, 1995). For example, Hall and his colleagues (Hall et al., 1993) compared preschool-aged children's interpretation of novel nouns versus novel adjectives. In these studies, an object was considered to be *familiar* if children had an existing label for the object (e.g., a hat); an object was considered to be *unfamiliar* if children had no existing label for it (e.g., a cornucopia). These researchers demonstrated that children's ability to use syntactic form as a cue to meaning varied directly as a function of the children's familiarity with the object kind. If a novel word was applied to a familiar object, then 4-year-olds distinguished novel nouns from adjectives, extending nouns to other members of the target object's category of objects and extending novel adjectives to other objects sharing a property with the target. However, if the novel word was applied to an unfamiliar object, then children failed to distinguish novel nouns from adjectives in their performance: they extended both nouns and adjectives to categories of objects. Thus, although preschoolers are able to use syntactic form as a cue to meaning (on familiar trials), they do not take advantage of these syntactic cues to meaning in all situations (on unfamiliar trials). This is relevant to the current experiments because it suggests that infants will be more likely to use syntactic form as a cue to meaning if they have an existing basic level name for the objects we present. Therefore, to maximize the likelihood that infants would take advantage of the syntactic cues to meaning, we included objects with basic level names that were familiar to infants at 21 months.

Fourth, we selected two types of properties that are likely to be perceptually salient to infants. We included texture (e.g., soft versus hard) because these property terms emerge fairly early in the lexicon (Fenson et al., 1994).[1] We included color terms (e.g., yellow versus green) because they represent an interesting case in acquisition. Across languages, color

1. Typically adjectives referring to salient changes of state (e.g., hot, dirty, wet, broken) (Dromi, 1987; Fenson et al., 1994; Nelson, 1976) tend to be acquired before those referring to inherent properties of the objects (including texture and color). We did not include the change of state properties in these experiments because it is difficult to manipulate these in an experimental task.

terms are almost uniformly marked as adjectives (Dixon, 1982, 1994; Wetzer, 1992), and although infants' color perception is remarkably similar to that of adults (Bornstein, Kessen, & Weiskopf, 1976), young children nonetheless appear to have a curious difficulty mapping specific color terms to their meaning (Bornstein, 1985a; Kowalski & Zimiles, 1995; Landau & Gleitman, 1985; Rice, 1980; Soja, 1994). Color terms emerge late, as compared to other property terms (Bornstein, 1985b). Moreover, once children have begun to acquire color terms, their mappings of these terms to specific hues tends to be inaccurate and inconsistent (Bornstein, 1985a, but see Shatz, Gelman, Behrend, & Ebeling, 1996). This difficulty appears to reflect children's expectations about which property concepts warrant lexicalization.

RANGE OF APPLICATION FOR ADJECTIVES

We also examined infants' expectations regarding the semantic or conceptual range of application for novel adjectives. For adult speakers of English, adjectives can serve several different kinds of functions (Bolinger, 1967; Carey & Bartlett, 1978; Gelman & Markman, 1985; Lyons, 1968; Prasada, 1992; Waxman, 1990; Wierzbicka, 1986). For example, they can be used to identify a salient property of an individual (e.g., a red chair); they can be extended across individuals within a given category (e.g., the red chairs); and they can be extended across different categories (e.g., the red chairs, a red cup).

Notice, however, that the precise meaning associated with a given adjective is influenced by the noun that it modifies. Consider, for example, the meanings associated with adjectives like *hot, soft,* and *big.* A *hot* bath and a *hot* stove are not the same temperature; a *soft* song and a *soft* pillow are not the same in amplitude or texture; a *big* mouse and a *big* elephant are not the same size. As these examples illustrate, these adjectives do not provide absolute measures. On the contrary, they indicate a relative point along a continuum, whose range is delimited by the category itself.

This semantic dependency on nouns has been observed across languages in morphological, syntactic, and lexical analyses of adjectives. For example, in languages that mark gender and number, adjectives must accord morphologically and syntactically with the nouns they modify. In addition, as we have discussed, young word learners are more likely to map a novel adjective to an object property (as opposed to an object category) if the object under consideration is one for which the child has already acquired a basic level label (Hall et al., 1993; Markman & Wachtel, 1988). Furthermore, there is evidence that in both linguistic (Gelman & Markman, 1985; Hall et al., 1993; Macnamara, 1986; Smith, 1984; Soja, 1994; Waxman, 1990, 1995) and nonlinguistic tasks (Gentner & Rattermann, 1991; Kemler Nelson, 1983; Smith, 1984; Soja, 1994), preschoolers are more likely to attend to properties of objects when the objects are drawn from the same basic level kind. These observations suggest that there may be a linguistic and/or conceptual priority for establishing an object's kind before marking its properties.

We therefore asked whether infants initially depend upon the support of familiar basic level kinds in extending a novel adjective. If this is the case, then they should succeed in extending property terms (e.g., *red,* applied to a red chair) to other objects from the same basic level kind (e.g., other red chairs) but should fail to extend property terms to objects from different basic level categories (e.g., other red objects, including apples and crayons). However, it is also possible that infants will not limit their extension of property terms in this way: Because infants' sensory and perceptual endowments permit them to detect the tactile and visual experiences underlying the extension texture and color terms, they may succeed in extending adjectives broadly to objects across different basic level kinds (e.g., other red objects, including apples and crayons). We test these alternatives by examining infants' ability to extend adjectives within a given basic level category (Experiments 1 and 2) and their ability to do so across different basic level categories (Experiment 3).

EXPERIMENT 1

In Experiment 1, we asked whether a novel adjective, applied ostensively to a familiar object, would direct 21-month-old infants' attention to properties of the objects when those objects were all drawn from the same basic level kind. Infants participated in a match-to-sample task consisting of three objects from the same familiar basic level kind (e.g., three cars). For infants in a *Novel Adjective* condition, the targets were labeled with a novel adjective (e.g., "This one is *X*"). For infants in a *No Word* condition, the targets were introduced, but no novel labels were offered (e.g., "Look at this"). If 21-month-old infants extend adjectives to objects with shared properties, then those in the Novel Adjective condition should be more likely than those in the No Word condition to choose a test object with the same property (color or texture) as the target object. The No Word condition serves as a control for perceptual salience of the test objects; it

also permits us to determine whether infants are more likely to focus on object properties in the context of hearing a novel adjective than in a nonlinguistic control task.

One other design feature bears mention. As we have discussed, we suspected that the ability to map an adjective to an object property may be a newly emerging capacity at 21 months of age. If this is the case, then infants' tendency to extend adjectives systematically may become more apparent as they gain experience in our task. We therefore introduced a blocking factor in each experiment to permit us to compare performance on a first and second round of trials (see below).

In sum, we predicted that infants in the Novel Adjective condition would be more likely than those in the No Word condition to select the test objects with the same property (color or texture) as the target object and that this tendency would become more pronounced over time.

Method

Participants

Twenty-four 21-month-olds (14 boys and 10 girls) were recruited from a population of middle-class families in the greater Chicago area. All were in the process of acquiring English as their first language. We selected infants with a production vocabulary of at least 50 words, based upon the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991). Twelve additional participants were excluded because of fussiness (five), failure to make a clear choice on three or more forced-choice trials (three), experimenter error (two), or production vocabulary lower than 50 words (two).[2] The final sample included infants ranging in age from 20.23 to 22.24 months, with a mean age of 21.20 months. There were approximately equal numbers of males and females in each condition; males were older than the females (males: $M = 21.43$; females: $M = 20.76$), $t(21) = 2.48$, $p < .03$.

Stimuli

The stimuli consisted of 36 small, lightweight objects that were easily manipulated by the participants (see Table 1). The objects were selected to form 12 different sets, each composed of three discriminably different exemplars from the same basic level kind (e.g., three cars). These three objects were not identical. Instead, they differed slightly in their overall contours and could therefore be distinguished. Each set was constructed to include one target object (e.g., a yellow car), a test object that matched the target on a single property (e.g., a different yellow car), and a test object that contrasted with the target on that property (e.g., a green car).

The property types under consideration were color and texture. There were two object sets representing each comparison. In this, and in all subsequent experiments, the target and matching test object were identical in color on color trials; the target and matching test object were identical in texture on the texture trials. We accomplished this by painting target and matching test objects with the *same* color whenever necessary for the color trials and by covering the target and matching test objects with the *same* material (e.g., rough burlap, plush fabric, smooth vinyl) whenever necessary for the texture trials.

Stimulus Selection

To insure that the basic level names for these objects were familiar to infants at this age, we selected objects based upon data from an independent sample of 21-month-old infants ($N = 30$) whose parents had completed Part 1 of the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991) as part of a previous investigation. The basic level terms were represented in these infants' productive vocabularies at a rate of 86% (*range* = 53%–100%).

Procedure

Infants were tested individually in a laboratory playroom. Each session began with a brief period during which the infant became acquainted with the laboratory and the experimenter. Following this introduction, the infants were seated in an infant seat attached to a table, with the parent seated at an adjoining side of the table. The experimenter sat at the opposite side of the table, facing the infant. The parent, who was present throughout the session, was asked not to talk (either to the infant or to the experimenter) or to influence in any way the infant's attention to the stimuli. Sessions lasted approximately 15 min and were videotaped for later transcription.

Infants completed 12 trials, with a different object

2. The proportion of participants excluded from Experiments 1–3 on the basis of vocabulary production is consistent with normative data on vocabulary acquisition at 21 months (Fenson et al., 1994).

Table 1 Objects Used in Experiments 1 and 2

Property Type	Target	Test Objects: Matching Property	Test Objects: Contrasting Property
Color:			
Yellow	Yellow car	Yellow car	Green car
Yellow	Yellow plane	Yellow plane	Green plane
White	White dog	White dog	Brown dog
White	White bear	White bear	Brown bear
Blue	Blue cup	Blue cup	Red cup
Blue	Blue bowl	Blue bowl	Red bowl
Texture:			
Soft	Soft horse	Soft horse	Hard horse
Soft	Soft cow	Soft cow	Hard cow
Shiny	Shiny spoon	Shiny spoon	Dull spoon
Shiny	Shiny fork	Shiny fork	Dull fork
Smooth[a]	Smooth hat	Smooth hat	Rough hat
Smooth[a]	Smooth ball	Smooth ball	Rough ball
Rough[b]	Rough hat	Rough hat	Smooth hat
Rough[b]	Rough ball	Rough ball	Smooth ball

[a] Included only in Experiment 1.
[b] Included only in Experiment 2.

set presented on each. These were divided into two blocks (Block 1 and Block 2). Each block included one trial for each of the three color sets and one trial for each of the three texture sets. Within each block, the order of presentation was completely counterbalanced, alternating between color and texture.

Familiarization Phase

Each trial began with a familiarization phase, during which the experimenter presented the infant with all three objects from a given set, saying, "Look at these!" The infant was encouraged to play with the objects for a total of 30 s. The experimenter then retrieved all three objects from the infant.

Test Phase

The test phase immediately followed the familiarization phase. The experimenter placed all three objects in a row, directly in front of the infant but just beyond the infant's reach. The target was in the center; the two test objects were approximately 12 inches to the right and to the left of the target object. The matching property test object was placed on the right side for exactly half of each infant's trials.

Infants were randomly assigned to either the Novel Adjective or No Word conditions. In the Novel Adjective condition, the experimenter labeled the target object, saying, for example, "[Infant's name]. See this? This is a(n) *X* one. This one is *X*. Can you find another *X* one?" Table 2 provides a complete list of novel labels used in Experiments 1, 2, and 3. In the No Word condition, the experimenter drew attention to the target object but offered no label, saying, for example, "[Infant's name]. See this? Look at this. Look at this one. Can you find another one?" The experimenter then moved the two test objects forward (separated by approximately 8 inches), within the infant's easy reach. When the infant selected an object, the experimenter said, "Thank you!" and the trial ended. If the infant did not make a clear choice (i.e., selected both objects simultaneously or made no selection), the experimenter repeated her request as follows. She placed the two test objects in front of the infant, held the target object in one hand and extended her other hand toward the infant's midline. In the Novel Adjective condition, she said, "Can I have

Table 2 Novel Labels Used in Experiments 1, 2, and 3

Property	Novel Label
Yellow	Citron
White	Glozen
Blue	Azure
Soft	Plushy
Shiny	Argent
Smooth[a]	Limpid
Rough[b]	Burlap

[a] Included only in Experiment 1.
[b] Included only in Experiments 2 and 3.

another *X* one?" In the No Word condition, she said, "Can I have another one?"

Language Measure

While the infant was engaged in the task, the parent completed the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991).

Coding

The videotaped sessions were coded to ascertain which test object, if any, the infant chose during each trial. Infants could choose (1) the matching test object, (2) the contrasting test object, (3) both objects, or (4) neither object. Tapes were coded with sound removed to ensure that coders were blind to the condition in which each child had participated. A second coder independently rated the videotaped sessions of six participants, three per condition. Intercoder agreement was computed as the proportion of the trials on which the coders agreed. Agreement between coders was 95%.

Results

Language Measure

Total vocabulary. The production vocabulary of infants included in this experiment ranged from 52 to 512 words, with a mean of 262 words (SD = 133).[3] Vocabulary size did not differ as a function of gender or condition. Overall, words for objects (nouns in the adult lexicon) accounted for 64% of the infants' productive vocabulary; words describing properties (adjectives in the adult lexicon) accounted for only 7%. Twenty-one of the 24 parents reported that their infant had begun to combine words to form phrases.

Familiarity with terms for objects and properties. The basic level terms for objects included in this experiment were highly familiar to our participants: these terms were represented in infants' production vocabulary at a rate of 83% (*range* = 65%–100%). In contrast, the property terms were less familiar:[4] they were represented in infants' production vocabulary at a rate of 39% (*range* = 0%–67%).

3. *T*-tests revealed no significant differences in the vocabulary scores of included participants versus those excluded due to fussiness, failure to choose, or experimenter error in Experiments 1–3.

4. Data on the property terms come from the reports of 10 children whose parents completed a modified version of the MacArthur Checklist in which we added the terms *clear* and *shiny*. The remaining parents were not asked about these latter terms.

Match-to-Sample Task

Infants made clear choices, selecting one of the two test objects on 98% of their trials. We computed the proportion of (completed) trials in which the infant chose the matching test object. Figure 1 presents a summary of the results. A four-way analysis of variance, with condition (Novel Adjective versus No Word) and gender as between-participants factors, and block (1 versus 2) and property type (color versus texture) as within-participants factors, revealed a significant main effect of condition, $F(1, 20) = 6.84$, $p < .02$, effect size $f = .50$.[5] As predicted, infants in the Novel Adjective ($M = .58$) condition were more likely than those in the No Word ($M = .47$) condition to choose the test objects with the matching property.

The analysis also revealed a main effect for gender, $F(1, 20) = 10.96$, $p < .005$ (males: $M = .59$; females: $M = .44$), and a property type × gender interaction, $F(1, 20) = 10.384$, $p < .005$. Post hoc analyses of simple effects (setting alpha at .05) revealed that males more often selected the matching test object on color than on texture sets (color: $M = .68$, texture: $M = .50$), but that females more often selected the matching test object on texture than color sets (color: $M = .36$, texture: $M = .52$). There were no other main effects or interactions.

We next compared infants' performance to the level expected by chance (.50). As predicted, performance in the No Word condition did not differ from chance. However, infants in the Novel Adjective condition chose the matching test object at a rate that marginally exceeded chance, $t(11) = 2.18$, $p < .05$, two-tailed. We also compared performance on each block of trials to the level expected by chance. Performance in the No Word condition did not differ from chance on either the first ($M = .48$) or second ($M = .46$) block of trials. In the Novel Adjective condition, infants also failed to reveal a reliable preference on Block 1 ($M = .54$), but on Block 2, there was a trend toward favoring the matching test object ($M = .63$), $t(11) = 1.82$, $p < .10$, two-tailed, effect size $f = .48$. The effect size associated with this trend suggests that the tendency to map novel adjectives to object properties on the second block is likely a replicable one. We pursue this trend in Experiment 2. Finally, we examined each individual participant's pattern of response. Recall that participants were presented with 12 trials in the forced-choice task. Following the binomial formula and setting $p \leq .05$, participants se-

5. Rosenthal and Rosnow (1984) describe $f = .10$ as small effect size, $f = .24$ as a moderate effect size, and $f = .37$ as a large effect size. Following this guideline, the effect size for condition is robust.

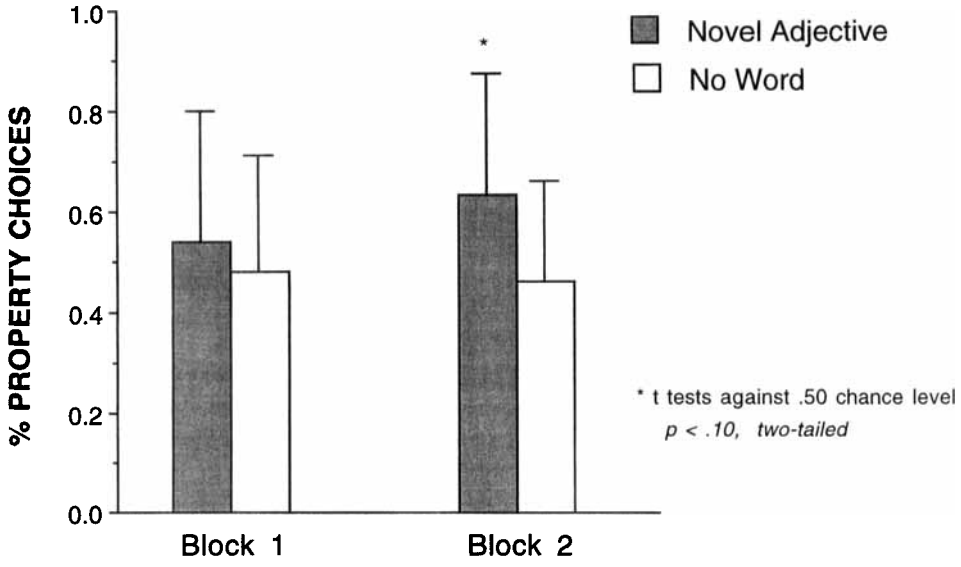

Figure 1 Experiment 1: Mean percent selection of the matching test object, as a function of condition and block

lecting the matching test object on nine or more trials can be characterized as displaying "consistently property-based" behavior. Two infants in the Novel Adjective condition met this criterion; none in the No Word condition met this criterion.

We next examined participants' performance for each of the six properties (three colors, three textures) under investigation. Our motivation was to discover whether there were particular properties that elicited a disproportionate tendency to select either the matching or contrasting test object. To examine this possibility, we determined the mean performance and the 95% confidence interval for each property (collapsed across the two trials for each property) for each condition. In the Novel Adjective condition, only one property (shiny) fell below this confidence interval. In the No Word condition, one property fell above (clear) and one fell below (shiny) the confidence interval. This detailed examination reveals an impressive degree of balance among property sets.

Discussion

The results of Experiment 1 provide preliminary evidence for an emergent ability at 21 months to map a novel adjective, applied ostensively to a familiar object, to other objects sharing a salient property (color or texture). In addition, an examination of performance on first and second blocks raised the possibility that infants' tendency to map adjectives to object properties may become more pronounced as they gain experience in this task. Finally, performance varied as a function of infants' gender. In Experiment 2, we pursue these findings in several ways.

EXPERIMENT 2

Our primary goal was to replicate the finding that infants have begun to extend novel adjectives to other objects with the same properties (e.g., color, texture) when those objects are drawn from the same basic level kind. Second, we asked whether this effect is specific to novel adjectives, or whether novel words from other grammatical categories (especially count nouns) also highlight properties of objects at 21 months of age. We addressed this question by including a *Novel Noun* condition as a control. If this emergent ability to map words to properties is specific to novel adjectives, then performance in the Novel Noun condition should mirror that in the No Word control. However, if the effect is a more general consequence of applying novel words to objects, then performance in the Novel Noun condition should mirror that in the Novel Adjective condition. We also pursued the possibility that the influence of novel adjectives becomes more apparent on the second block of trials than on the first. We examined the unanticipated effect of gender by selecting a sample of males and females that were closely matched for age. Finally, we asked whether participants' tendency to extend adjectives to other objects with the same properties in this task varied as a function of the perceptual

similarity between the target and the matching test object.

Method

Participants

Thirty-six 21-month-olds (18 boys and 18 girls) were recruited from a population of middle-class families in the greater Chicago area. All were acquiring English as their first language. As in Experiment 1, we selected infants with a production vocabulary of at least 50 words, based upon the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991). Twelve additional participants were excluded because of fussiness (three), failure to choose on three or more trials (three), or production vocabulary lower than 50 words (six). The final sample included infants ranging in age from 20.33 to 22.60 months, with a mean age of 21.34 months. There were approximately equal numbers of males and females in each condition. Males (M = 21.11, SD = .56) and females (M = 21.57, SD = .64) did not differ in age.

Stimuli

The stimuli consisted of 36 small, lightweight objects that were easily manipulated by the participants (see Table 1).

We asked eight undergraduate students to rate the perceptual similarity between each target and its associated test objects, using a scale ranging from 0 (the two objects are identical) to 6 (the two objects are extremely different). We explained that because these stimuli were to be used in a study with infants, participants should downplay their knowledge about the objects and focus primarily on the appearance of the objects themselves. As expected, participants rated the targets as more similar to the matching test object (M = 1.91, ranging from 1.17 to 2.75) than to the contrasting test object (M = 3.20, ranging from 2.25 to 4.25), $t(7) = 13.13$, $p < .001$. This effect held up for 11 of the 12 sets; on the remaining set (in which the soft horse served as a target), participants judged that the matching and contrasting test objects were equally similar to the target. The ratings also confirmed our intuition that the target and matching test object were not perceived as identical to one another, $t(7) = 8.73$, $p < .001$.

Procedure

The procedure was identical to that in Experiment 1 but for one design change in the blocking of trials. As in Experiment 1, there were two blocks of six trials each, and each block included one trial for each of the three color sets and one for each of the three texture sets. Within each block, all three color sets and all three texture sets were presented in sequence rather than in alternating fashion (the sequence within each property type was counterbalanced). Within each block, half of the infants were presented with color sets followed by texture sets; the remaining infants saw texture sets first, followed by color sets.

Familiarization Phase

This was identical to that in Experiment 1.

Test Phase

Each infant was randomly assigned to either the Novel Adjective, Novel Noun, or No Word condition. See Table 2 for a complete list of novel words. The instructions in the Novel Adjective and No Word conditions were identical to those in Experiment 1. Instructions in the Novel Noun condition differed from those in the Novel Adjective condition only in the linguistic context in which the novel words were introduced. In the Novel Noun condition, the experimenter labeled the target object, saying, "[Infant's name]. See this? This is a(n) X. This one is an X. Can you find another X?" If the infant failed to make a clear choice, the experimenter repeated her request, saying, "Can I have another X?"

Language Measure

While infants participated in the task, parents completed a modified version of Part 1 of the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991). We added the words *clear, shiny, rough,* and *smooth* to the inventory to gauge infants' familiarity with the names for all of the properties used in the experiment.

Coding

Coding was identical to that in Experiment 1. A second coder independently rated the videotaped sessions of nine participants, three per condition. Agreement between coders was 96%.

Results

Language Measure

Total vocabulary. The infants' production vocabulary ranged from 50 to 493 words, with a mean of 220

words (SD = 123). Vocabulary size did not differ as a function of condition. Overall, words for objects (nouns in the adult lexicon) accounted for 64% of the infants' vocabulary; words describing properties (adjectives in the adult lexicon) accounted for only 6%. Thirty-one of the 36 parents reported that their infant had begun to combine words to form phrases.

Familiarity with object and properties. The basic level terms for objects included in this experiment were represented in infants' production vocabulary at a rate of 77% (*range* = 47%–100%). In contrast, the property terms were represented in infants' production vocabulary at a rate of 21% (*range* = 0%–44%).

Match-to-Sample Task

Infants made clear choices, selecting one of the two test objects on 96% of their trials. We computed the proportion of (completed) trials in which the infant chose the matching test object (see Figure 2). The data were then submitted to a four-way analysis of variance, with condition (Novel Adjective versus Novel Noun versus No Word) and gender as between-participants factors and block (1 versus 2) and property type (color versus texture) as within-participants factors. There were no main effect or interactions involving gender.

This analysis did reveal a significant main effect of condition, $F(2, 30) = 3.40$, $p < .05$, effect size f = .43 (Novel Adjective M = 59, Novel Noun M = .51, No Word M = .43). This effect was qualified by a condition × block interaction, $F(2, 30) = 3.65$, $p < .05$, effect size f = .44. Post hoc analyses of the simple effects revealed that on the first block, there was no difference between performance in the Novel Noun (M = .56) and Novel Adjective (M = .56) conditions and that infants in each of these conditions were more likely to select the matching test object than were infants in the No Word (M = .43) condition, Fisher LSD, both $ps < .05$. On the second block, however, a more specific effect for novel adjectives became evident. Infants in the Novel Adjective (M = .62) condition were more likely than those hearing novel nouns (M = .46) or no word (M = .52) to select the matching test object, Fisher LSD, $p < .05$. There was no difference between performance in these latter two conditions. Therefore, providing infants with experience in this task made it possible to detect their emerging sensitivity to the distinction between the grammatical categories *adjective* and *noun* and to uncover their emerging tendency to map adjectives to object properties.

A subsequent series of analyses based upon comparisons to chance (.50) lends additional support to this interpretation. As can be seen in Figure 2, on Block 1, infants did not reveal a preference for the matching test object in any of the three conditions. On Block 2, however, infants in the Novel Adjective condition did reveal this preference, $t(11) = 2.26$, $p < .02$, one-tailed. It is striking that this increased

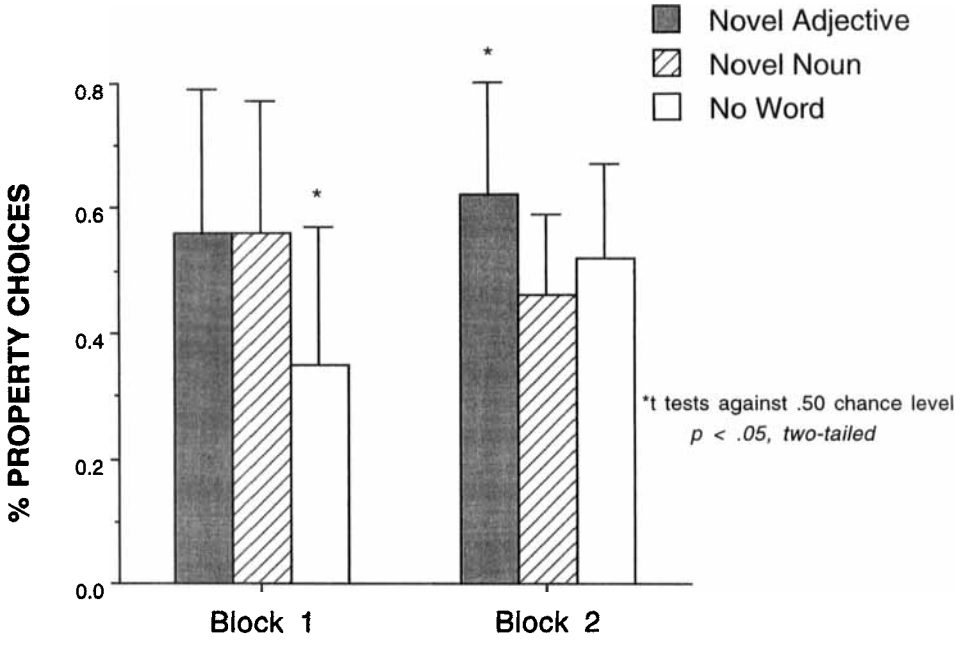

Figure 2 Experiment 2: Mean percent selection of the matching test object, as a function of condition and block

attention to object properties did not obtain in the Novel Noun condition. This pattern of results reveals that a specific influence of novel adjectives became most apparent after experience in this task.

In a subsequent analysis, we examined each individual participant's pattern of response, as in Experiment 1. Following the binomial formula and setting $p \leq .05$, five infants in the Novel Adjective condition displayed a "consistently property-based" pattern; none in either the Novel Noun or No Word condition met this criterion. This individual analysis is consistent with the suggestion that by 21 months of age, infants are more likely to extend novel adjectives than nouns to objects sharing salient properties.

We next examined infants' performance for each of the six properties (three colors, three textures) under investigation. As in Experiment 1, we determined the mean performance and the 95% confidence interval for each property (collapsed across the two trials for each property) for each condition. In the Novel Adjective condition, only one property fell above (plush) and one fell below (shiny) this confidence interval. In the Novel Noun condition, one property fell above (plush) and one fell below (rough) the confidence interval. In the No Word condition, two fell above (blue, white) and one fell below (rough) the confidence interval. As in Experiment 1, the balance among property sets was impressive.

We also asked whether infants' tendency to select the matching test object varied systematically as a function of the perceptual similarity between that object and the target (as rated by adults). A Spearman rank correlation coefficient revealed no significant correlation in any condition between infants' choices and adults' perceptual similarity ratings, suggesting that infants' performance was not mediated by perceptual similarity alone.

Finally, we examined the effects of participants' familiarity with the words for object kinds and object properties on their performance on the match-to-sample task. First, we selected those trials on which infants were familiar with the words for the objects presented. The results from these *familiar object* trials mirrored the condition effect, reported above in the more inclusive analysis, with participants selecting the matching test object at a rate of .60, .39, and .43 in the Novel Adjective, Novel Noun, and No Word conditions, respectively.

Second, we considered participants' performance as function of their familiarity with the *property* words. For trials on which participants were familiar with the property, infants selected the matching test object at a rate of .62, .42, and .50 in the Novel Adjective, Novel Noun, and No Word conditions, respectively. For trials on which participants were unfamiliar with the property, they selected the matching test object at a rate of .56, .52, and .41, respectively. Thus, whether or not they were familiar with the property words on a given trial, infants hearing novel adjectives selected predominantly the matching test object. This was not the case for infants hearing novel nouns or no novel words.

Third, we examined performance on those trials on which the participants were familiar with the object word and unfamiliar with the property word. Participants selected the matching test object at a rate of .62, .45, and .40 in the Novel Adjective, Novel Noun, and No Word conditions, respectively. This pattern of results supports the position that by 21 months of age, infants have begun to (1) map novel adjectives to object properties and (2) distinguish between novel words presented as nouns versus adjectives. Thus, the differences among conditions that emerged in the more inclusive analysis are sufficiently robust to hold up under these more detailed comparisons of the effects of familiarity with words for the objects and properties under examination.

Discussion

The results of Experiment 2 replicate and extend the finding that when a novel adjective is applied ostensively to a familiar object, 21-month-olds are likely to extend that adjective to other objects with shared properties (color or texture) when those objects are drawn from the same basic level kind. These results also suggest that at 21 months, infants are sensitive to syntactic cues distinguishing adjectives from count nouns in English and that they are more likely to extend novel adjectives than count nouns to object properties. This pattern becomes more apparent with experience in this task. This "training effect," which was evident only in the Novel Adjective condition, may reflect the fact that at this particular developmental moment, a specific expectation regarding the mapping between adjectives and object properties is in the process of emerging. In addition, the "training" provided in the first block may help infants to discern what types of variation they will encounter among the objects within a given trial (see Macario, Shipley, & Billman, 1990).

Three null effects in this experiment are worthy of mention. First, we find no differences in performance as a function of property type (color versus texture), suggesting that the effect of novel adjectives is not limited to one particular property. Second, we find no effect of gender, suggesting that the unanticipated gender differences observed in Experiment 1 may be unstable (and may be attributable to the slight, but reliable, age difference between males and females

in that experiment). Third, performance in the Novel Noun condition did not differ from chance. This outcome is consistent with other evidence that infants at this age expect novel nouns to refer to categories of objects (Waxman & Hall, 1993; Waxman & Markow, 1995). Because both test objects in Experiment 2 were drawn from the same basic level kind as the target object, we suspect that infants considered both to be appropriate extensions of the novel noun.

Together, the results of Experiments 1 and 2 indicate that (1) at 21 months of age, infants are sensitive to syntactic cues that distinguish novel adjectives from count nouns, (2) the tendency to extend novel adjectives, applied ostensively to familiar objects, to other objects sharing the same property (color or texture) has begun to emerge, and (3) this tendency becomes more evident with experience in the task. However, these results are limited to the cases in which the objects under consideration are all members of the *same* basic level kind. To redress this limitation, in Experiment 3 we ask whether infants' tendency to extend novel adjectives on the basis of shared properties is evident when the objects are drawn from *different* familiar basic level kinds. At issue is whether infants' success in mapping adjectives to object properties is dependent upon the support of familiar basic level kinds. (See Hall, 1994; Hall et al., 1993; Macnamara, 1986; Waxman & Hall, 1993, for evidence regarding the importance of a familiar basic level kind in word learning.)

EXPERIMENT 3

In Experiment 3, we asked whether infants' expectations regarding adjectives and properties of objects extends to cases in which the objects are drawn from different basic level kinds. Infants were randomly assigned to either a Novel Adjective or No Word condition. If infants' expectation regarding novel adjectives emerges initially with the support of a familiar basic level kind, then infants should be unlikely to extend novel adjectives to other objects from different basic level kinds. However, if infants' expectation is independent of basic level kind, then infants in the Novel Adjective condition should reveal a preference for the matching test objects, as was the case in Experiments 1 and 2.

Method

Participants

Twenty-four 21-month-olds (10 boys and 14 girls) were recruited from a population of middle-class families in the greater Chicago area. All were in the process of acquiring English as their first language and had production vocabularies of at least 50 words, based upon the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991). Twenty-one participants were excluded because of fussiness (four), failure to choose on three or more trials (nine), production vocabulary lower than 50 words (five), experimenter error (two), or equipment failure (one).

The final sample included infants ranging in age from 20.23 to 22.70 months, with a mean age of 21.35 months. There were approximately equal numbers of males and females in each condition. Males (M = 21.33, SD = .76) and females (M = 21.37, SD =.80) did not differ in age.

Stimuli

The stimuli consisted of 36 small, lightweight objects that were selected to form 12 different sets of three objects each (see Table 3). Each set consisted of one target object (e.g., yellow spoon) and two test objects (e.g., yellow key, green key). The matching and contrasting test objects were drawn from the same basic level kind in an effort to equate them on any extraneous factors that might influence infants' choice at test. For example, infants at this age are often influenced by salient thematic or idiosyncratic relations among objects.

Stimulus Selection

An analysis of data from an independent sample of 21-month-old infants (N = 30) whose parents had completed Part 1 of the MacArthur Communicative Development Inventory: Toddlers (Fenson et al., 1991) revealed that most infants had the basic level name for each object in their production vocabulary (M = 84%, *range* = 53%–100%). (This was the same sample that we used in stimulus selection for Experiment 1.)

We asked 10 undergraduate students to rate the perceptual similarity between each target and its associated test objects, using a scale ranging from 0 to 6, as in Experiment 2. Participants rated the targets as more similar to the matching test object (M = 4.59, ranging from 3.25 to 5.18) than to the contrasting test object (M = 5.49, ranging from 4.7 to 6.0), $t(9) = 6.66$, $p < .001$. This effect held up for all 12 sets. The ratings also confirmed our intuition that the target and matching test object were not perceived as identical to one another, $t(9) = 23.34$, $p < .001$.

Table 3 Objects Used in Experiment 3

Property	Target	Test Objects: Matching Property	Test Objects: Contrasting Property
Color:			
Yellow	Yellow spoon	Yellow key	Green key
Yellow	Yellow horse	Yellow car	Green car
White	White plane	White chair	Brown chair
White	White bottle	White bear	Brown bear
Blue	Blue bed	Blue boat	Red boat
Blue	Blue cat	Blue cup	Red cup
Texture:			
Soft	Soft block	Soft cow	Hard cow
Soft	Soft bird	Soft banana	Hard banana
Shiny	Shiny ball	Shiny spoon	Dull spoon
Shiny	Shiny car	Shiny fork	Dull fork
Rough	Rough cup	Rough hat	Smooth hat
Rough	Rough shoe	Rough ball	Smooth ball

Procedure

The procedure was identical to that in Experiment 2.[6] Infants were randomly assigned to either a Novel Adjective or No Word condition.

Language Measure

This was identical to that in Experiment 2.

Coding

Two different measures were derived from the videotapes. The match-to-sample task (test phase) was coded as in previous experiments. We also coded infants' spontaneous formation of pairs of objects during the familiarization phase. For any given triad, three types of pairs were possible: (1) kind pairs (from the same basic level kind, but with different properties: two test objects); (2) property pairs (with the same property, but from different basic level kinds: target object and matching test object); and (3) no relation pairs (from different basic level kinds with different properties: target object and nonmatching test object). An infant was credited with forming a pair if the infant grouped two objects together at any time during familiarization. On any given trial, the formation of one pair type did not exclude the formation of others in the infants' spontaneous play.

A second rater independently coded the videotaped session of six participants, three per condition. Interrater agreement (computed as in Experiment 1) was 99% for the forced-choice task (test phase) and 95% for the formation of object pairs (familiarization phase).

Results

Language Measure

Total vocabulary. The infants' production vocabulary ranged from 64 to 639 words, with a mean of 315 words (SD = 175). The two groups did not differ in either age or vocabulary size. Overall, words for objects (nouns in the adult lexicon) accounted for 65% of the infants' vocabulary; words describing properties (adjectives in the adult lexicon) accounted for only 6%. Twenty-three of the 24 parents reported that their infant had begun to combine words to form phrases.

Familiarity with object and properties. The basic level terms for objects included in this experiment were highly familiar: they were represented in infants' production vocabulary at a rate of 87% (*range* = 75%–100%). In contrast, the property terms were unfamiliar: they were represented in infants' production vocabulary at a rate of 26% (*range* = 0%–50%).

6. There was one difference in blocking patterns. As in Experiment 2, infants completed two blocks of six trials each. For half of the infants, the blocking pattern was identical to that used in Experiment 2: each block included one trial for each of the three color sets and one trial for each of the three texture sets, presented in sequence. For the remaining half of the participants, each block included all the trials from a given property type, with both trials for each particular value presented one after the other. Within each block, the order of presentation was counterbalanced. An ANOVA, with blocking pattern as a between-participants factor, revealed no main effect of blocking pattern and no interaction between blocking and condition.

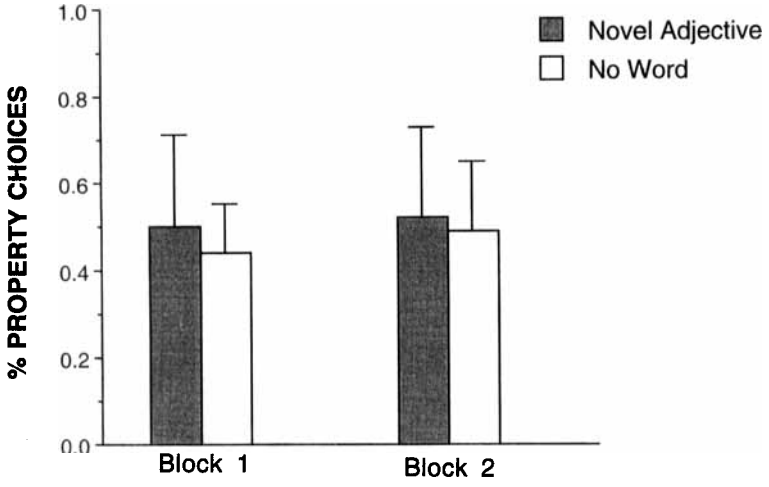

Figure 3 Experiment 3: Mean percent selection of the matching test object, as a function of condition and block

Match-to-Sample Task

Infants made clear choices, selecting one of the two test objects on 98% of their trials. However, in striking comparison to the previous experiments, when the objects were drawn from different basic level kinds, there was no observable influence of novel adjectives. We computed the proportion of (completed) trials in which the infant chose the matching test object (see Figure 3). A four-way analysis of variance, with condition (Novel Adjective versus No Word) and gender as between-participants factors and block (1 versus 2) and property type (color versus texture) as within-participants factors revealed no main effects or interactions. Moreover, performance did not differ from chance (.50) in either condition. When we adopted the binomial formula (as in Experiments 1 and 2) to examine individual participant's responses, we found that only one infant in the Novel Adjective and none in the No Word condition met the criterion for "consistently property-based" behavior. A Spearman rank correlation coefficient revealed no correlation in either condition between infants' choices and adults' perceptual similarity ratings. Finally, when we examined whether participants' familiarity with the words for object kinds and object properties influenced their performance on the match-to-sample task (as in Experiment 2), no reliable differences emerged.

Familiarization Phase

We also examined infants' spontaneous formation of object pairs during the familiarization phase. Recall that for any given triad, three types of pairs were possible: (1) kind pairs (from the same basic level kind, but with different properties: two test objects); (2) property pairs (with the same property, but from different basic level kinds: target object and matching test object); and (3) no relation pairs (from different basic level kinds with different properties: target object and nonmatching test object). We derived the proportion of trials on which each infant made each of the three possible types of pairs and submitted these to an analysis of variance, with condition (Novel Adjective versus No Word) as a between-participants factor and pair type (kind versus property versus no relation) as a within-participants factor. This analysis revealed a main effect of pair type, $F(2, 44) = 10.76$, $p < .001$. A contrast analysis revealed that infants formed kind pairs on a greater proportion of trials than either property pairs or no relation pairs, $F(1, 44) = 20.25$, $p < .001$ (kind: $M = .57$, property: $M = .39$, no relation: $M = .43$). There was no other main effect or interaction. Therefore, infants across conditions devoted more attention during familiarization to shared membership in a basic level kind than to shared properties.

Discussion

The results of Experiment 3 differ markedly from the results of the two previous experiments. When all objects in a set were members of the same familiar basic level kind (Experiments 1 and 2), infants hearing novel adjectives applied to the target object revealed a tendency to select the test object with the same property as the target. However, when the target and test objects were drawn from different basic level kinds (Experiment 3), novel adjectives did not

have this effect: infants in the Novel Adjective condition failed to reveal a preference during test and failed to derive any benefit on the second block of trials.

This finding is consistent with the hypothesis that infants initially rely upon basic level kinds to map adjectives to properties of objects. Three other observations provide additional support for this interpretation. First, during familiarization, infants spontaneously grouped the objects according to object kind more often than object property. Second, there is anecdotal evidence that infants could not find a satisfactory match for the target object. When the experimenter requested an object during the test phase, some infants looked around the room and under the table, as if searching for another test object. This behavior was not observed in Experiments 1 and 2. Third, there was a threefold increase in the attrition rate in this experiment as compared to Experiments 1 and 2. Recall that in each experiment, infants who failed to make a clear choice on three or more trials were excluded from the final sample. Only three infants each were excluded from Experiments 1 and 2 for this reason, as compared to nine in Experiment 3. These observations suggest that infants may have been disturbed by the absence of a test object from the same basic level kind as the target.

GENERAL DISCUSSION

The goal of this series of experiments was to examine the conditions under which young learners of English succeed in mapping a novel adjective, applied ostensively to an individual object, to other objects with the same object property (either color or texture). These experiments yielded three main findings. First, the ability to extend a novel adjective to other objects with the same property has begun to emerge in infants as young as 21 months of age (Experiments 1 and 2). Infants who heard novel words presented as adjectives revealed a preference for the test object that shared a common property with the named target object; infants hearing no novel words revealed no such preference.

Second, 21-month-old infants revealed an emerging distinction between novel words presented as count nouns versus adjectives. Unlike infants hearing novel adjectives, those hearing novel nouns were equally likely to choose between the two alternatives. This is consistent with other evidence documenting that infants at this age expect that novel nouns will to refer to object categories (see Waxman, 1995; Waxman & Hall, 1993; Waxman, Stote, & Philippe, 1997).

This is an important result because it provides the earliest documentation of young word learners' emerging ability to distinguish the grammatical category adjective from that of noun on the basis of syntactic cues and to assign these grammatical categories distinct types of meaning. Previous investigations have revealed distinct patterns of interpretation for these two grammatical categories at 2½ years of age (Hall et al., 1993; Hall & Moore, 1997; Taylor & Gelman, 1988; Waxman, 1990, 1995). Evidence for an emerging distinction between novel adjectives and nouns at 21 months is impressive, but there is little doubt that a fuller and richer appreciation of the semantic and syntactic distinctions between these grammatical forms will become more clearly sharpened with age and language experience. Indeed, because the mappings between adjectives and their associated meanings appear to be a consequence of language-specific learning, it will be important to document the developmental change that occurs as children hone in on the specific meanings associated with adjectives in their native language (Waxman, Senghas, & Benveniste, 1997).

A third main finding concerns the role of object kind in the interpretation of novel adjectives. Infants succeeded in extending a novel adjective, applied ostensively to the target, to other objects sharing the same salient property only when those objects were drawn from the same familiar basic level kind (Experiments 1 and 2). In sharp contrast, when the objects were drawn from different familiar basic level kinds, infants failed to extend the novel adjectives systematically (Experiment 3). In a more recent panel of studies, we have documented precisely the same pattern in children as old as 3 years of age. Three-year-olds successfully map adjectives from a target to a test object when all objects are drawn from the same basic level kind but fail to do so when the objects are drawn from different basic level kinds (Klibanoff & Waxman, 1997; Waxman & Markow, 1997). Thus, object kind appears to play a key role in the interpretation of novel adjectives beyond infancy: Infants' and young children's expectations regarding the range of application of novel adjectives may unfold within the support of a familiar basic level kind. This early aspect of adjectival use (within basic level kinds) may serve as the entry point for working out the semantic and syntactic distinction between count nouns and adjectives applied ostensively to objects.

What factors might underlie this foundational role for the basic level? We suspect that the answer to this question will involve a consideration of lexical, perceptual, and conceptual factors. Consider first the issue of lexical knowledge. Recall that children are more likely to interpret novel adjectives as referring to object properties (as opposed to object kind) if they

are already familiar with a count noun label for the objects (Hall et al., 1993; Markman & Wachtel, 1988; Waxman, 1995). In Experiments 1 and 2, all objects in each set were drawn from the same familiar basic level kind (e.g., three airplanes). In contrast, in Experiment 3, each set included objects from different basic level categories (e.g., an airplane [target] and two chairs [test objects]). Although infants were familiar with the basic level names for each individual object, they likely lacked a familiar inclusive label for these diverse sets. Their failure to extend adjectives systematically in Experiment 3 may have been a consequence of this fact. If the difference between performance on basic versus multiple level sets does reflect differences in lexical knowledge, then infants' ability to extend novel adjectives should also be impaired on basic level sets for which infants have no existing name (e.g., aardvarks).

Infants' successful extension of adjectives on basic level sets may also be related to perceptual and/or conceptual factors. For example, the holistic similarity among objects in the basic level sets may have sharpened the perceptual distinctions among the objects (see Gentner & Markman, 1994; Gentner & Rattermann, 1991; Kemler Nelson, 1983; Shepp & Swartz, 1976; Smith, 1984) and facilitated a mapping between the adjectives and perceptual properties. Another possibility is that infants succeeded on the basic level sets because the wording in the Novel Adjective condition implied a distinct subordinate-level contrast (see Gelman & Taylor, 1984; Prasada, 1997; Taylor & Gelman, 1988; Waxman, 1990; Waxman, Shipley, & Shepperson, 1991). Our recent work with preschool-aged children suggests that this is unlikely to account for the phenomenon: at 3 years of age, children's difficulty mapping novel adjectives across basic level categories persisted even when the experimenter explicitly stated the name of the object kinds presented at test (e.g., "This is a plushy block. Can you find a plushy cow?"; Klibanoff & Waxman, 1997). In future work, it will be important to tease apart the relative contributions of lexical, perceptual, and conceptual factors and to specify more precisely the level(s) of abstraction at which infants succeed in this task by extending the current paradigm to include superordinate- and global-level categories.

The results of the current experiments are relevant to both theoretical and practical concerns regarding the acquisition of adjectives. Interestingly, much of the developmental research on the acquisition of adjectives has capitalized on conditions in which the adjective picks out a property within, but not across, basic level kinds (see Au & Markman, 1987; Gelman & Markman, 1985; Hall et al., 1993; Prasada, 1992; Taylor & Gelman, 1988; Waxman, 1990). These results, coupled with those reported here, may offer some insight into the acquisition of the color lexicon, for they suggest that children's well-documented difficulty mapping color terms may derive, at least in part, from the conditions under which adults typically attempt to "teach" these terms. Applying a single color term (e.g., "This is *purple*") to objects from different basic level kinds (a bowl, a sneaker, a ball, and so on) appears to be a strategy that is likely to fail with young word learners (see Baldwin, 1989; Rice, 1980). Young word learners are more likely to establish the appropriate mappings if the color terms are applied across different objects from within the same basic level kind (see Au & LaFramboise, 1990; Carey & Bartlett, 1978; Soja 1994).

Although the current experiments shed light on infants' emerging ability to map adjectives to color and texture, a goal of future work is to determine how widely these results generalize to other types of properties. We predict that the basic level will provide crucial support for the acquisition of other property types as well. This raises an intriguing question: How do infants interpret a novel property term (e.g., *hot*), applied to an individual object, if they have not already acquired a basic level count noun (e.g., *pot*) for that object? We predict that in such situations, infants will interpret the novel word as a label for the object category (pot) rather than the object property (hot) (see Hall et al., 1993; Macnamara, 1986; Markman & Wachtel, 1988; Waxman, 1994). This prediction is consistent with anecdotal evidence that in such situations, young word learners tend to extend *hot* to categories of objects (i.e., to other pots, hot or otherwise), rather than to properties of objects (i.e., to other hot objects).

In closing, these experiments have advanced our understanding of the early relation between word learning and conceptual development by broadening the focus to include the acquisition of words other than count nouns and concepts other than object categories. We have demonstrated that at 21 months of age, infants acquiring English have begun to extend novel adjectives, applied to individual objects, to other objects sharing a salient property with that individual. Somewhat paradoxically, however, these experiments have also uncovered a key role for count nouns and object kinds in the interpretation of novel adjectives; infants' ability to establish this mapping may unfold within the support of a familiar basic level category.

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