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Specifying the scope of 13-month-olds' expectations for novel words

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Abstract

Recent research has documented that for infants as young as 12–13 months of age, novel words (both count nouns and adjectives) highlight commonalities among objects and, in this way, foster the formation of object categories. The current experiment was designed to capture more precisely the scope of this phenomenon. We asked whether novel words (count nouns; adjectives) are linked specifically to category-based commonalities from the start, or whether they also direct infants' attention to a wider range of commonalities, including property-based commonalities among objects (e.g. color, texture). The results indicate that by 12–13 months, (1) infants have begun to distinguish between novel words presented as count nouns versus adjectives in fluent, infant-directed speech, and (2) infants' expectations for novel words accord with this emerging sensitivity. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

Infants' remarkable early achievements in language and conceptual development have been well-documented (Baillargeon, 1993; Aslin et al., 1998; Bloom, 1998; Maratsos, 1998; Wellman and Gelman, 1998; Woodward and Markman, 1998). Moreover, recent research reveals that there are strong links between infant devel-

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opment in these two domains. Perhaps most striking is the link between object naming and object categorization. For infants as young as 9–13 months of age, naming draws infants' attention to commonalities among objects and facilitates the formation of object categories (Waxman and Markow, 1995; Balaban and Waxman, 1997; Fulkerson and Haaf, 1998; Waxman, 1998).

This phenomenon was first revealed in 12- to 13-month-old infants with a novelty-preference task (Waxman and Markow, 1995). Infants were first familiarized to four different members of a given object category (e.g. four animals), and then presented at test with (a) a new member of the now-familiar object category (e.g. another animal) and (b) an object from a contrasting object category (e.g. a vehicle). If infants formed object categories in this task, they should reveal a decrease attention over the four familiarization trials, and a novelty-preference at test. To examine the contribution of naming on object categorization, Waxman and Markow introduced the familiarization objects either in conjunction with novel count nouns, novel adjectives, or no novel words. For infants who had begun to produce words on their own, the results were straightforward. Infants hearing novel words (either count nouns or adjectives) successfully formed superordinate level object categories (e.g. animal, vehicle); those hearing no novel words failed to do so.

Thus, for infants who are on the threshold of producing language, naming highlights commonalities among objects and facilitates the formation of object categories. Apparently, this link between naming and categorization is in place early enough to guide infants in their first efforts to map words to meaning, and to promote their acquisition of object categories. This early link also supports the evolution of more specific expectations, linking particular grammatical forms (e.g. count noun versus adjective) to particular types of meaning (e.g. object category versus object property) (Pinker, 1984; Gleitman, 1990; Bloom, 1993; Grimshaw, 1994; Hall and Moore, 1997; Taylor and Gelman, 1988; Waxman, 1998).

In the current experiment, we seek to capture more precisely the scope of this early link between object naming and categorization. At issue is whether infants embark upon the process of acquisition with an expectation linking novel words specifically to object categories (e.g. flamingos, animals), or whether they initially link novel words to a wider range of groupings, including, for example, property-based commonalities (e.g. color: pink things; texture: soft things). To this end, we retain the logic and design of the paradigm of Waxman and Markow (1995), but change the focus from object categories (e.g. flamingo, animal) to individual object properties (e.g. pink things, soft things). To be sure, this approach itself hinges on a psychological distinction between object categories versus object properties. Most current accounts distinguish object categories (also known as kinds, natural kinds or sortals) from other types of groupings (e.g. pink things, things to pull from a burning house) on at least three (related) grounds: object categories (1) are richly-structured, (2) capture many commonalities, including deep, non-obvious relations among properties (as opposed to isolated properties), and (3) serve as the basis for induction (Barsalou, 1983; Murphy and Medin, 1985; Kalish and Gelman, 1992; Gelman and Medin, 1993; MacNamara, 1994; Medin and Heit, in press). Interestingly, although infants and children lack detailed knowledge about most object categories, they

clearly expect named object categories to serve these functions (Keil, 1994; Gelman, 1996). In addition, there is now evidence for a psychological distinction between individual properties and relations among properties in infancy (Younger and Cohen, 1986; Bhatt and Rovee-Collier, 1997).

We selected two types of object properties, color and texture, because they are perceptually salient to infants and because groupings based on these property-types can cut across object category boundaries. For example, a grouping of *pink things* may include individuals from diverse object categories, including flamingos, shirts, and cotton candy. Therefore, these property-based commonalities typically do not underlie object categories.¹

In the experiment reported here, infants were familiarized to four different objects that shared an object property (e.g. four purple objects). At test, we presented both (a) a new object with the now-familiar property (e.g. another purple object) or (b) an object with a contrasting property (e.g. a blue object). Infants detecting the property-based commonality among familiarization objects should reveal a preference for the novel object at test. We observed performance in either the Noun, Adjective and No Word conditions.

This design permitted us to ask whether novel words (count nouns; adjectives) are linked specifically to object categories from the start, or whether they also direct infants' attention to the property-based commonalities presented in this task. The design also permitted us to ascertain whether infants distinguish between novel words presented as count nouns versus adjectives. In previous work, infants have treated these grammatical forms identically with respect to object categorization: both count nouns and adjectives have directed infants' attention to commonalities underlying object categories (Waxman and Markow, 1995). However, whether infants distinguish between these grammatical forms in other contexts, and whether this distinction has consequences on the formation of groupings other than object categories remains very much an open question. We consider three alternatives.

1.1. Hypothesis 1

Novel words (both count nouns and adjectives) direct infants' attention to a wide range of commonalities. If this is the case, then novel words should highlight the property-based commonalities presented here, just as they highlighted the more richly-structured object categories presented in Waxman and Markow (1995).

1.2. Hypothesis 2

Novel words (both count nouns and adjectives) direct infants' attention specifically to the commonalities underlying object categories. If this is the case, then novel words should fail to highlight property-based commonalities; their facilitative effect should be restricted to the commonalities underlying more richly-structured object categories (as in Waxman and Markow, 1995).

¹In contrast, an object's shape may be more centrally related to category membership, particularly for simple artifacts and for animate objects (Waxman and Braig, 1996).

1.3. Hypothesis 3

Infants are sensitive to (at least some of the) distinctions between novel words presented as count nouns versus adjectives, and reveal different expectations that accord with this sensitivity. If this is the case, then novel words from these two word classes should exert different effects on the novelty-preference task. Notice that this alternative does not necessarily require infants to have fully-developed syntactic distinctions between count nouns and adjectives. Rather, it requires (a) that infants can distinguish (at least some of) the contexts for count nouns from the contexts for adjectives, and (b) that their expectations *viz a viz* object categories and object properties accords with this emerging distinction. Recent research indicates that by 12 months, infants are sufficiently attuned to cues within the speech signal (including prosody, stress, and structural position) to support some emerging distinctions among the grammatical categories (Gleitman, 1990; Jusczyk et al., 1992; Best, 1995; Echols, 1996; Fernald and McRoberts, 1996; Fisher and Tokura, 1996; Gerken, 1996; Jusczyk and Kemler Nelson, 1996; Mehler et al., 1996; Morgan et al., 1996; Werker et al., 1996). Whether these distinctions influence infants' expectations *viz a viz* word-to-world mappings remains to be seen.

2. Method

2.1. Subjects

Thirty-six infants (18 males; 18 females) with a mean age of 13.50 months, ranging from 12.70 to 14.54 months) were recruited from a population of middle class families in the greater Chicago area. All were acquiring English as their first language. We scheduled only those infants whose parents reported (in a brief telephone interview) that their infant produced at least three words.² Two infants, who failed to complete the procedure, were excluded.

2.2. Stimuli

The stimuli were 40 small commercially-manufactured objects made from light-weight materials, ranging in size from $6 \times 3 \times 2$ cm to $8 \times 7 \times 6$ cm. They varied in color, shape, texture and detailed markings. These were selected to form four different sets of 10 objects each (see Table 1). For each property-type, two sets were created (e.g. color, purple versus blue; texture, soft versus hard). For each set, during familiarization, half of the infants saw four discriminably different objects drawn from within the same basic level category (e.g. Within-basic: four purple horses);

²We adopted this criterion to provide a clear point of comparison with the earlier work of Waxman and Markow (1995), which documented (1) that the median productive vocabulary for 12- to 13-month-olds from this particular population is two words, and (2) that infants with relatively high vocabularies (e.g. those producing more than two words) offered the strongest patterns of results. We therefore sought a comparable sample in the current experiment.

Table 1
Familiarization and test phase objects^a

Set	Familiarization phase				Test phase
<i>Color</i>					
Purple versus blue (within basic)	purple horse	purple horse	purple horse	purple horse	purple versus blue horse
(across basic)	purple cat	purple plate	purple spatula	purple bottle	
Yellow versus pink (within basic)	yellow duck	yellow duck	yellow duck	yellow duck	yellow versus pink duck
(across basic)	yellow mule	yellow truck	yellow plate	yellow plane	
<i>Texture</i>					
Rough versus smooth (within basic)	rough block	rough block	rough block	rough block	rough versus smooth block
(across basic)	rough cup	rough ball	rough hat	rough boot	
Soft versus hard (within basic)	hard carrot	hard carrot	hard carrot	hard carrot	soft versus hard carrot
(across basic)	hard orange	hard fish	hard bottle	hard plane	

^aObjects presented during the familiarization phase differed in contour, size, and detailed markings. Objects presented during the test phase were identical in contour, size, and detailed markings. The objects in each pair differed only with respect to the object property under consideration.

the remaining infants were familiarized to four objects drawn from across different basic level categories (e.g. Across-basic: four purple objects, including a cat, plate, spatula, bottle). For each set, there were two test objects, one with the same property and one with a contrastive property (e.g. a purple versus a blue horse).

Insuring against a priori preferences among test objects. In an independent control study, 10 additional infants (six females; four males) were presented with each test pair for 30 s each. Order of presentation was counterbalanced. There were no preferences on any of the test pairs. Thus, any preferences that emerge in the experiment proper can be attributed to the experimental manipulations.

2.3. Procedure

Infants were tested individually in a laboratory playroom. They were seated in an infant seat, directly across from the experimenter. The parent, who was seated to the side of the infant³, was instructed not to talk (either to the infant or the experimenter) or to influence in any way the infant's interest in or attention to the stimuli. Sessions lasted approximately 10 min and were videotaped for later transcription.

The procedure included a familiarization phase and a test phase. Each infant completed this procedure with each of the four different sets of objects (Table 1).

³In some instances, infants preferred to sit in their parents' lap.

2.3.1. Familiarization phase

The experimenter offered the infant the familiarization objects from a given set (e.g. four different blue airplanes) one at a time, in random order, for 30 s each. To secure the infant's attention, the experimenter began each familiarization trial by calling the infant's name, while holding the object directly in front of the infant, but just beyond reach. For each set, half of the infants in each condition (see below) were familiarized to objects within the same basic level category (e.g. four purple horses); the other half were familiarized to objects drawn from across different basic level categories (e.g. a purple cat, plate, spatula, and bottle).

Infants were randomly assigned to an Adjective, Noun, or No Word condition (see Table 2). In all conditions, the experimenter used infant-directed speech. The distinct intonational and prosodic contours characteristic of this speech register are especially effective in arousing and sustaining infants' attention (Fernald and McRoberts, 1996). This register also facilitates infants' ability to parse the continuous speech signal into words and phrases (Gleitman, 1990; Gerken, 1996). In addition, we selected phrases that occur typically in infant-directed speech. In the Adjective and Noun conditions, these phrases convey the intended grammatical form of the novel word.

In the No Word condition, the experimenter drew attention to each object but offered no label, saying, for example, '[Infant's name]. Look here. Look at this.' In the Adjective condition, she said, '[Infant's name]. This one is X-ish.' The novel adjectives were: blick-ish, fop-ish, dak-ish, and cham-ish. In the Noun condition, she said, '[Infant's name]. This one is a(n) X.' The novel nouns were: blicket, fopin, dakup and chamu. After approximately 10 s had elapsed, the experimenter indicated the object again, using one of the following phrases: 'Do you like that? (No Word condition); 'Do you like the X-ish one?' (Adjective condition); 'Do you like the X?' (Noun condition).

These instructions were offered on familiarization trials 1, 2, and 4. On familiarization trial 3, all infants were treated identically. They were told, '[Infant's name].

Table 2
Introductory phrases

Condition	Familiarization phase				Test phase
	Trial 1	Trial 2	Trial 3	Trial 4	
Adjective	This one is X-ish.	This one is X-ish.	See what I have?	This one is X-ish.	See what I have?
	Do you like the X-ish one?	Do you like the X-ish one?	"	Do you like the X-ish one?	
Noun	This one is a(n) X.	This one is a(n) X.	See what I have?	This one is a(n)X.	See what I have?
	Do you like the X?	Do you like the X?	"	Do you like the X?	
No word	Look here.	Look here.	See what I have?	Look here.	See what I have?
	Look at this.	Look at this.		Look at this.	
	Do you like that?	Do you like this?	"	Do you like this?	

See what I have?’ This design feature permitted us to examine infants’ attention on familiarization trials with (trials 1, 2, and 4) and without (trial 3) novel words.

2.3.2. *Test phase*

The test phase was identical in all conditions. For each set of objects, a single test trial followed the familiarization trials. The experimenter held a pair of test objects in front of the infant, but slightly beyond the infant’s reach. Both members of the test pair were drawn from the same basic level category (e.g. two horses), with one representing the now-familiar property (e.g. purple) and the other representing a novel property (e.g. blue). The experimenter said, ‘[Infant’s name]. See what I have?’, and then placed the test objects within the infant’s reach, separated by approximately 14 ins. The left-right placement of the test objects was randomized across sets. After 45 s had elapsed, the objects were removed from the infant’s view.

During the familiarization and test phases, infants manipulated all objects freely. If an infant pushed a toy out of reach or dropped it off the table, the experimenter placed it back within the infant’s reach as quickly as possible. Trial length was not extended to compensate for infants’ behavior.

2.3.3. *Language measure*

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

2.3.4. *Coding*

The videotaped sessions were transcribed with the sound removed to insure that the coders, who were blind to the experimental hypotheses, were also blind to condition assignment. We coded infants’ general attention to the objects presented during both familiarization and test. This measure includes the time that infants spend looking at and/or actively manipulating objects (including fingering, banging and mouthing). This measure correlates highly with looking time (Ruff, 1986; Waxman and Markow, 1995). Analyses based on this measure were consistent with those based on looking-time alone.

A primary coder coded all the infants. A second coder independently rated three infants from each condition. Consistency between coders, computed for each trial and then averaged across trials, was 90% for the familiarization phase and 89% for the test phase. There were no systematic inconsistencies between coders.

3. Results

3.1. *Language inventory*

Infants revealed a mean production vocabulary of 16 words (ranging from 0 to

112), and a mean comprehension vocabulary of 112 words (ranging from 5 to 327). Production and comprehension vocabularies were significantly correlated ($r(34) = 0.49$; $P < 0.01$).⁴

3.2. Novelty-preference task

3.2.1. Familiarization phase (see Fig. 1)

The data were submitted to an ANOVA with Condition (3) as a between-participants factor and Property-type (2), Level (2), and Trial (4) as within-participants factors. A marginal effect for Property-type, $F(1,33) = 4.099$, $P = 0.051$, was qualified by a property-type by level interaction, $F(1,33) = 4.437$, $P < 0.05$. On within-basic trials, infants devoted more attention on the texture than on the color sets, Tukey LSD, $P < 0.05$; on across-basic sets, there were no differences between texture and color sets. A main effect for Trial, $F(3,99) = 9.959$, $P < 0.001$, indicated that infants devoted more attention to objects on Trials 1 and 2 than on Trials 3 and 4 (Tukey HSD, both P 's < 0.05). There were no reliable differences between Trials 1 and 2, or between Trials 3 and 4. The polynomial contrasts for the Trial effect revealed a reliable linear component, $F(1,33) = 21.375$, $P < 0.001$.

Further inspection of Fig. 1 suggested an intriguing difference between infants in the No Word control, as compared to those in the Adjective and Noun conditions. In these latter two conditions, there is a dip in attention on Trial 3 (on which no novel word was presented) and a subsequent recovery of interest on Trial 4 (when the novel word was again presented). This cubic pattern was not evident in the No Word condition. To test the reliability of this observation, we examined the polynomial contrasts in each condition for cubic components. The cubic component was significant in the Adjective and Noun conditions (combined), $F(1,22) = 4.648$, $P < 0.05$; in the No Word condition, tests for this cubic component failed to reach significance. This suggests (1) that infants hearing novel words during familiarization detected the difference between trials on which novel words were present versus those on which novel words were absent (Trial 3), and (2) that these infants devoted more attention to objects when novel words were present. Because all objects were presented with infant-directed speech, we can attribute this heightened attention to the presence of the novel word, per se, rather than to an excitatory effect of infant-direct speech, in general.

3.2.2. Test phase (see Fig. 2)

We computed the novelty-preference for each set, dividing each infant's attention devoted to the novel object by the attention devoted to the novel and familiar objects. We compared novelty-preferences in each condition to the chance level of responding (0.50). Infants in the Adjective condition revealed reliable novelty-

⁴Although we scheduled only infants whose parents reported (via telephone interview) that their infant produced more than two words, the more thorough examination based on the MCDI revealed that some of the infants in our sample actually produced fewer (*Adjective* ($n = 2$), *Noun* ($n = 2$), *No Word* ($n = 4$)). However, these infants performed comparably to others in their respective conditions (see Footnote 5).

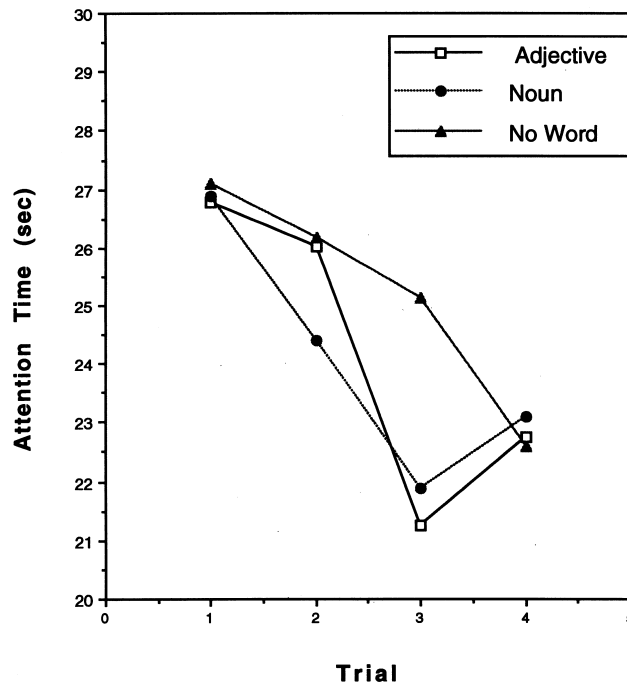


Fig. 1. Familiarization phase. The mean duration of attention during familiarization trials 1–4 as a function of condition.

preferences (mean = 0.63; $t(11) = 3.88$, $P < 0.005$); infants in the Noun (mean = 0.54) and No Word (mean = 0.50) conditions revealed no preferences. A contrast analysis indicated that the novelty-preference in the Adjective condition was stronger than that in the Noun and No Word conditions (combined), $t(33) = 1.97$, $P < 0.025$.⁵

Finally, we examined each individual infant's performance by tabulating the

⁵This pattern of elevated performance in the *Adjective* condition held up in several supplementary examinations. For example, we observed this same pattern in infants producing fewer than three words, according to the MCDI, as well as those producing three or more words. Moreover, this pattern did not vary as a function of level. On both within-basic and across-basic level sets, novelty-preferences were elevated in the *Adjective* condition (mean = 0.66, 0.60, respectively, both P 's < 0.05), but not in the *Noun* (mean = 0.56, 0.52, respectively, n.s.) or *No Word* (mean = 0.48, 0.53, respectively, n.s.) conditions. Note that at first glance, this appears to be at odds with recent evidence that adjectives are initially extended within, but not across, basic level object categories (Waxman and Markow, 1998; Klibanoff and Waxman, 1998). However, we suspect that this apparent discrepancy reflects important differences in task demands. In the current novelty-preference task, infants viewed four different exemplars of the target object property; in the aforementioned studies, which utilized a forced-choice task, participants viewed only a single exemplar before making their response. Recent evidence documents that when participants in forced-choice tasks are permitted to view multiple exemplars, they also succeed in mapping adjectives to object properties across different basic level categories (Mintz and Gleitman, 1998; Waxman and Klibanoff, 1999).

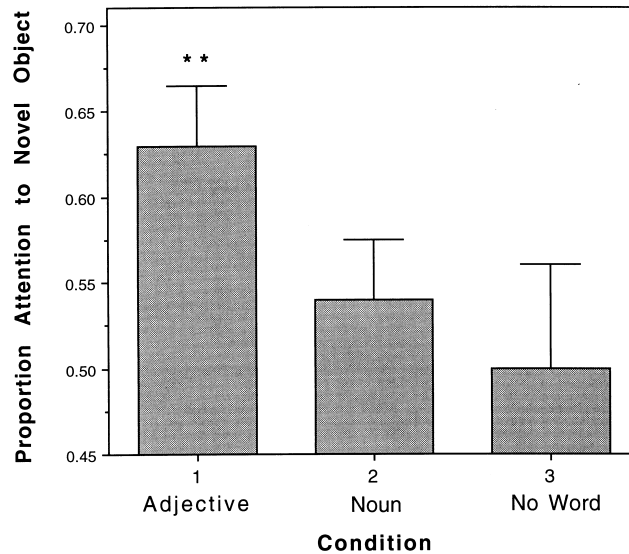


Fig. 2. Test phase. The mean novelty-preference score as a function of condition. Asterisks indicate comparisons to chance responding (0.50).

number of trials (out of four) on which each infant revealed a novelty preference (see Table 3). In the Adjective condition, 75% of the infants revealed novelty preferences consistently on at least three trials, as compared to 17% and 42% in the Noun and No Word conditions, respectively. Thus, the strong novelty preferences observed in the Adjective condition in the main parametric analysis reflect a tendency that is characteristic of most individuals.

The elevated novelty-preferences in the Adjective condition, as compared to the Noun and No Word conditions, is consistent with Hypothesis 3, as outlined in the introduction. This pattern is intriguing for two reasons. First, the difference between the Adjective and No Word conditions suggests that novel words, presented as adjectives, highlight property-based commonalities among objects. Second, the difference between the Adjective and Noun conditions suggests that by 13 months, infants have begun to distinguish between novel words presented as count nouns

Table 3

Number of individuals in each condition revealing novelty preferences on 0, 1, 2, 3, or 4 trials

	Number of trials (out of 4)				
	0	1	2	3	4
<i>Condition</i>					
Adjective	0	0	3	6	3
Noun	0	0	10	0	2
No Word	0	5	2	3	2

versus adjectives. Words presented as adjectives, but not as count nouns, highlight property-based commonalities.

But how can this null effect in the Noun condition be reconciled with the facilitative effect of novel count nouns in closely-related work (Waxman and Markow, 1995; Balaban and Waxman, 1997; Fulkerson and Haaf, 1998). These results suggest that at 13 months, (1) infants expect novel adjectives to highlight commonalities underlying object categories (as in earlier work) as well as object properties (as presented here), but that (2) they have begun to form a more specific expectation for count nouns, linking them to object categories, but not to the object properties presented here (see below). The null effect in the Noun condition in the current experiment is entirely consistent with this interpretation. On the within-basic sets, both test objects (e.g. blue versus purple horse) were equally good members of the object category (horse) presented during familiarization. On the across-basic sets, the only commonality among familiarization objects was property-based (e.g. color or texture). Thus, if infants hearing novel nouns searched specifically for a common object category, then they should reveal no consistent preferences at test.

4. General discussion

The goal of the current experiment was to specify the scope of infants' early expectations regarding novel words, an expectation that involves a world-to-word mapping. On the world side, the question was whether 13-month-olds expect words to map specifically to the commonalities underlying object categories (e.g. flamingos, animals), or whether their expectation is more encompassing, including a wider range of groupings. On the word side, the question was whether 13-month-olds have begun to distinguish between novel words presented as count nouns versus adjectives.

The results support two new conclusions. First, the familiarization data provide a compelling demonstration that novel words direct infants' attention to objects. Infants in both the Adjective and Noun conditions revealed a dip in attention on familiarization trials on which no novel words were presented (Trial 3). Previous work has compared infants' attention to named objects versus those presented in silence (Baldwin and Markman, 1989) or in conjunction with tones or simple melodic sequences (Roberts and Jacob, 1991; Balaban and Waxman, 1997). The current experiment represents a significant advance: Because we presented infant-directed speech on all trials, we can now attribute infants' heightened attention on named trials to the presence of the novel word, in particular, rather than to an excitatory effect of infant-direct speech, in general. Indeed, infants' heightened attention to named objects suggests an attentional mechanism by which novel words may facilitate the acquisition of object categories, particularly at the earliest stages of word learning. Second, the results begin to clarify the scope of infants' initial expectations regarding object naming and categorization. By 13 months, infants are sensitive to (at least some of the) distinctions between novel words

presented as count nouns versus adjectives. Words presented as adjectives, but not count nouns, highlight property-based commonalities. Both of these results have been replicated.⁶

Forging a distinction between grammatical forms. Clearly, 13-month-olds identified at least some of the relevant surface cues that distinguished count nouns from adjectives. Although we cannot pinpoint precisely which cues they recruited, several cues (including prosody, morphology, and structural position) are likely candidates. We presented novel adjectives and nouns in contexts that differed as a function of several such cues, including morphology (e.g. count nouns were always composed of two unique syllables; adjectives were composed of one unique syllable, followed by the adjectival suffix –ish). There were also systematic differences in prosody and structural position (e.g. count nouns were preceded by an unstressed functor (a determiner) and were always presented in phrase-final position; adjectives were preceded by an unstressed functor (determiner) on 50% of their presentations; they were phrase-final on 50% of their presentations, but were followed by an unstressed pronoun (one) on the remaining presentations.) Recent evidence confirms that infants are sensitive to cues like these within the speech signal, and that these cues are sufficiently rich to support an emerging distinction among (at least some) major grammatical categories (Morgan and Demuth, 1996). The results reported here go one step further; they demonstrate that these cues are detected reliably in fluent, infant-directed speech, that they support an emerging distinction between count nouns and adjectives, and that this emerging distinction may be recruited in the context of word learning.

This brings us to a second point, concerning how to best characterize infants' emerging distinction. The current data leave open two possibilities. Although it is possible that infants distinguished count nouns specifically from adjectives, it is also possible that infants forged a broader separation, distinguishing count nouns from other (as yet undifferentiated) grammatical categories. Future work may address this issue by examining infants' performance with additional grammatical forms (e.g. verbs, mass nouns) and additional kinds of commonalities among objects (e.g. objects involved in the same actions, or made of the same substances).

Infants' expectations for count nouns appears to be more specific than their expectations for adjectives. By 13 months, infants have begun to distinguish count nouns from other grammatical forms and to link them specifically to commonalities underlying object categories, and not to the property-based common-

⁶Both of these results have been replicated in a supplementary experiment involving 16 infants in each condition, all of whom produced at least three words (as measured by the MCDI). The procedure was virtually identical to that of the experiment proper, except that familiarization trials were shortened to 20 s. There were also minor variations in the stimuli presented. As in the experiment proper, infants hearing novel words (adjectives and count nouns) during familiarization devoted more attention during trials on which novel words were present versus those on which novel words were absent (Trial 3). The cubic trend was significant in the *Adjective* and *Noun* conditions (combined), $F(1,30) = 9.87, P < 0.005$, but not the *No Word* control. Second, at test, novelty-preferences in the *Adjective* condition (mean = 0.65) were stronger than those in the *Noun* (mean = 0.58) and *No Word* (mean = 0.57) conditions (combined), $t(45) = 1.89, P < 0.05$.

ities presented here. In contrast, adjectives appear to highlight a wider range of groupings, including the commonalities underlying object categories, as well as the property-based commonalities presented here. Infants' expectations for novel count nouns may be more precise than their expectations for other grammatical forms (including adjectives), either because these forms are more difficult to identify in the input, or because the mappings for them tend to be more variable, across languages and across development.

The evidence for an early and specific link between count nouns and object categories converges well with most current theories of language acquisition, which suggest (1) that the grammatical category noun may be established earlier, and via different mechanisms, than those for other grammatical categories, including adjectives, and (2) that the acquisition of these other grammatical forms may be dependent upon the prior acquisition of nouns and the establishment of reference (Dixon, 1982; Gentner, 1982; Pinker, 1984; Talmy, 1985; Wierzbicka, 1986; Huttenlocher and Smiley, 1987; Gleitman, 1990; Grimshaw, 1994; Maratsos, 1998; Waxman, 1998). Interestingly, this link between nouns and object categories is also reflected in the early lexicon. Despite variation across individuals and across languages, nouns typically constitute the predominant form in most infant lexicons (Gentner, 1982; Saah et al., 1996). By 13 months, most infants have successfully mapped several count nouns to object categories, but they have established far fewer, and less consistent, mappings for words from other form classes. Adjectives, for example, are virtually absent from the lexicon at 13 months.

In sum, the results of the current experiment are noteworthy because they (1) provide the earliest glimpse of infants' emerging distinction between grammatical forms in fluent, infant-directed speech, (2) suggest that this distinction affects infants' expectations regarding novel words, and (3) illustrate that a specific expectation linking nouns and object categories may be established early in development and consistently across languages.

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