

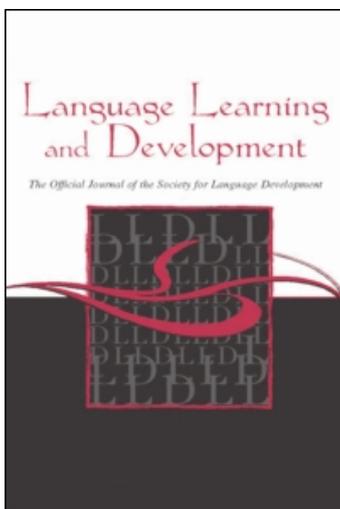
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Nouns, Adjectives, and the Acquisition of Meaning: New Evidence from Italian-Acquiring Children

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Nouns, Adjectives, and the Acquisition of Meaning: New Evidence from Italian-Acquiring Children

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Across languages, there is a tight coupling between nouns and object categories, but the coupling between adjectives and object properties reveals more variation. Previous work has established that the link between nouns and object categories is evident in preschool-aged children acquiring English, French, or Spanish but has revealed differences in how these children acquire adjectives across these languages. We pursue this work, adding new evidence from Italian-acquiring children and offering insights toward developing a fuller linguistic analysis of the phenomenon. We argue that there are strong universals in the treatment of adjectives across languages, but that there are also subtle cross-linguistic differences in adjectives that have developmental consequences.

Thanks in large part to innovative techniques designed to discover the capacities of infants and young children, scientific interest in questions concerning the relation between linguistic and conceptual systems of organization has acquired a distinctly developmental orientation. Within this orientation, research on word learning has taken a prominent role, primarily because it depends, at its core, on an interaction between young learners' linguistic and conceptual systems. To see why, consider a scenario in which a mature speaker (e.g., a parent) points to an ongoing stream of activity (e.g., a flamingo disappearing behind a dune), and utters a novel word (e.g., "Did you see the flamingo?"). To learn a word from this (indeed from any) context, the child must (a) parse the relevant word (*flamingo*) from running speech, (b) identify the relevant referent (the flamingo, not its color, the dune or the act of disappearing) from the ongoing stream of activity, and (c) establish a mapping between them.

In the current work, we focus on these mappings from a cross-linguistic developmental perspective. Our goal is to consider how children's interpretations of novel words are shaped by linguistic universals, as well as properties specific to their native language. We take as our starting point a provocative piece of evidence based on preschool-aged children acquiring English,

French, or Spanish as their native language (Waxman, Senghas & Benveniste, 1997). There were strong cross-linguistic convergences in the mappings that children established for novel nouns, but their expectations for adjectives varied by language. Waxman et al. (1997) (henceforth WSB) suggested that experience with different languages leads children to establish different tacit expectations regarding the use of adjectives. In the current work, we pursue this possibility by developing a fuller linguistic analysis of this phenomenon, and by adding new empirical evidence from children acquiring Italian as their native language. We examine the input that young Italian-acquiring children receive pertaining to adjective use (Experiment 1) and then consider whether Italian-speaking children's expectations for novel adjectives in a word learning task reflect certain features of this input (Experiment 2). Foreshadowing, we will argue that there are strong universals in the treatment not only of nouns but also adjectives across languages; however, we also identify a cross-linguistic difference in the treatment of adjectives that appears subtle on the surface but that nonetheless has developmental consequences.

BACKGROUND ISSUES: WORDS, GRAMMATICAL FORMS, AND MEANINGS

By the time they reach their first birthdays, infants are well on their way to mapping words to meaning. Already sensitive to the sound patterns of their native language, they successfully identify the relevant linguistic units (phonemes, morphemes, words) and use these to build a lexicon. In addition to these linguistic advances, infants also bring an impressive conceptual repertoire to the task of word learning. They appreciate a wide range of conceptual relations, including those organized around categories of objects (e.g., flamingo, animate object), properties of objects (e.g., pink, soft), and relations among objects (e.g., feed, run). (See Wilcox & Baillargeon, 1998; Quinn & Johnson, 2000; Waxman & Booth, 2003; Oakes & Madole, 2000; Hirsh-Pasek & Golinkoff, 2006.)

This rich conceptual repertoire, although impressive in and of itself, could in principle complicate the task of word-learning. How, in the face of this richness, do infants choose among the various relations when mapping a new word to its meaning? How do they learn that a given word (e.g., *flamingo*), applied to a particular individual object (a flamingo), can refer to that individual and can be extended to other members of the same object category (e.g., other flamingos), but not to salient parts or properties of the individual (e.g., its long neck or unusual color), or to salient actions in which it is engaged (e.g., feeding its young; disappearing behind a dune)? Several scholars have proposed that infants' success rests, at least in part, on the fact that in the context of word learning, they take advantage of cues that help them to home in on the relevant meaning (Hirsh-Pasek & Golinkoff, 2006; Bloom, 1990; Gleitman, 1990; Markman, 1989; Pinker, 1984; Quine, 1960; Waxman, 1999; Waxman, 2002).

One such cue is the grammatical form of a novel word. A fundamental feature of human language is that distinct grammatical forms (e.g., noun, adjective) highlight very different aspects of the same observed scene. For example, although either a noun (e.g., flamingo) or an adjective (e.g., pink) can be sensibly applied to an individual object (e.g., a pink flamingo), each conveys a very different type of meaning. In English, a count noun applied ostensively to an individual object ("That is a *flamingo*") typically refers to the named individual and can be extended taxonomically to other members of the same object category (e.g., other flamingos, other animals).

In contrast, an adjective applied to the same individual (“That is a *pink* one”) does not refer to the individual *qua* individual, but describes a salient property of the individual (e.g., color, texture) and can be extended to other objects sharing that property, even if they are members of different object categories (e.g., pink shoes, coffee cups and cookies).

Toddlers and young children appear to be sensitive to this fundamental feature of language: they consistently use the grammatical form of a novel word as a clue to its meaning (Gleitman, Cassidy, Nappa, Papafragou, & Trueswell (2005); Waxman & Lidz, 2006; Waxman & Markow, 1998; Woodward & Markman, 1998). However, this sensitivity does not emerge suddenly and in full force at one developmental moment. Instead, young word-learners’ sensitivity to the links between particular grammatical forms and particular types of meaning evolves gradually over the first 2 years.

Cascading Developmental Effects

At 9–12 months, infants harbor a broad expectation linking words (independent of their grammatical form) to a broad range of commonalities, including category-based (e.g., flamingo) and property-based (e.g., pink) commonalities (Waxman & Booth, 2003). This broad initial expectation sets the stage for the discovery of more specific expectations, linking particular kinds of words to particular kinds of meaning. Infants first carve out a specific link for nouns. At 12–13 months, infants acquiring English begin to distinguish count nouns from other grammatical forms and map them specifically to categories (and not properties) of objects (Booth & Waxman, 2003; Waxman & Booth, 2001; Waxman, 1999). This developmental step has now been documented in infants acquiring several different languages (Gathercole & Min, 1997; Hall & Lavin, 2004; Hall, Waxman, Bredart, & Nicolay, 2003; Imai & Haryu, 2001; Waxman, et al., 1997). However, at this same developmental moment, infants’ mappings for words from other grammatical categories, including adjectives and verbs, remains quite general (Waxman & Booth, 2001; Booth & Waxman, 2003; Echols & Marti, 2004). Infants appear to establish specific mappings for these predicate forms several months after the noun-category link is in place (Gleitman et al., 2005; Waxman & Lidz, 2006).

Consider, for example, the relatively protracted developmental path for adjectives. It is not until roughly 21 months that infants acquiring English begin to map adjectives specifically to properties of objects (e.g., color, texture). This effect has been demonstrated in infants acquiring Spanish at approximately 29 months (Waxman, 1998). Because adjectives are semantically and syntactically dependent upon the nouns they modify (Klibanoff & Waxman, 2000; Mintz & Gleitman, 2002; Waxman & Markow, 1998), it stands to reason that their acquisition would follow that of the nouns. In addition, infants’ ability to map verbs specifically to actions and relations among objects also appears to follow a relatively protracted developmental course (Waxman & Lidz, 2006; Piccin & Waxman, 2007; Waxman, Lidz, Braun & Lavin, manuscript under review; Imai, Haryu & Okada, 2005; Echols & Marti, 2004; Gentner, 1982; Hirsh-Pasek & Golinkoff, 2006; Gleitman & Gillette, 1999).

Cross-Linguistic Stability and Variation

This developmental evidence fits well with the picture that emerges from linguistic analyses. Languages differ not only in the grammatical forms that they use, but also in the ways that they

recruit these forms to convey meaning. Nouns are used in all human languages and are recruited universally to refer to individual objects and object categories. But there is substantially more cross-linguistic variation associated with the form *adjective*. Although many languages (like English) have richly developed adjective systems, in other languages (like Bantu and other African languages) the adjective system is sparse, including as few as 10 words. As a result, the types of meaning typically conveyed with adjectives in one language (e.g., English, Romance languages, etc.) must be expressed with a different grammatical form in other languages (Choi & Bowerman, 1991; Dixon, 1982; Talmy, 1985; Wierzbicka, 1986).

These developmental and cross-linguistic observations underscore the importance of considering whether and how the links between grammatical form and meaning may be shaped by the language under acquisition. Waxman, Senghas, and Benveniste (1997) addressed this question, focusing specifically on the mappings for nouns vs. adjectives. WSB focused on preschool-aged monolingual children acquiring either English, French, or Spanish as their mother tongue. Although these three languages are closely related, they offer an interesting set of cross-linguistic comparisons, primarily concerning the constructions in which *adjectives* typically appear and the meaning that these constructions convey. To get a flavor for these differences, consider, a cupboard holding several different coffee cups. Speakers of English, French, and Spanish may distinguish the cups linguistically with noun phrases (NP's) that include a determiner, an adjective, and an overt noun (e.g., "the *blue* cup," "a *blue* cup," "the *blue* one"). But under certain circumstances, the noun (whether it is lexically specific ["cup"] or generic noun ["thing" or "one"]) can be omitted from the surface of the sentence (e.g., "the wealthy"). As a result of this noun dropping (N-dropping), the surface structure of the NP includes only a determiner and adjective, but no overt noun (e.g., "un *azul*," lit. "a *blue*," corresponding to English "a blue one"). These constructions, which we call *det-A* constructions, are possible to some extent in all three languages.

Noun-Dropping and the Phenomenon of *Det-A* Constructions

It is important to point out that N-dropping does not occur solely in the context of adjectives. For example, in English and many other languages, N-dropping is permitted in NPs containing certain elements including demonstratives, numerals, and quantifiers (Gleitman, 1961). This appears to be related to the presence of agreement features on the element adjacent to the dropped noun (see Baker, 2005; Gleitman, 1961; Jespersen, 1922; Kester, 1996; Lobeck, 1995).

1. I liked these juicy apples, but you like those more.
2. I bought twenty apples and you already ate five/many.

N-dropping may also be licensed by focalization. For example, in (3), although there are no agreement features licensing N-drop, the noun can nonetheless be dropped if the adjective (hot) is given contrastive focus through stress (Gleitman, 1961; see also Merchant, 2001; Corver & van Koppen, 2006).

3. I prefer the mild salsa, but Rebecca prefers the **HOT**.

Although N-dropping can occur in several different contexts, our focus here is primarily on cases of N-dropping in NPs that include adjectives. We adopt this focus because our goal is to consider how learners acquire the mappings for adjectives and nouns and to consider whether the prevalence of N-dropping affects the course of acquisition of adjectives.

As we have pointed out, in all three languages investigated by WSB, N-dropping in the context of an adjective is possible. What differs, however, is the prevalence of these constructions in each language (See WSB for a fuller treatment of this phenomenon, and the Appendix for examples.) In Spanish, where both adjectives and articles are marked for grammatical number and gender, and where these markings are audible in speech, *det-A*'s are ubiquitous. By 2 years of age, Spanish-speaking children produce such constructions spontaneously (e.g., at 2;3 years: “*un bicho, voy bu(s)ca(r) los gigantes*” (a bug, I’m going to look for the giants [ones]) or at 2;8 years: “*un azul*” (a blue [one]) (MacWhinney & Snow, 1990; Snyder, Senghas, & Inman, 2001). In contrast, in English and French, *det-A* constructions are considerably less frequent, although they appear in a broader range of contexts in French than English. We suspect that this pattern—a higher frequency of *det-A* constructions in Spanish than French, and a higher frequency in French than English—may reflect the fact that in French and Spanish (but not English), determiners and adjectives are marked for grammatical number and gender and therefore license N-dropping through their agreement features. Because these agreement features are often inaudible in French, however, *det-A* constructions are licensed less freely in this language than they are in Spanish.

Returning to the issue at hand, there are two important features to notice about *det-A* constructions. First, in these constructions, adjectives appear in a surface position that is typically associated with nouns. Second, these constructions convey a meaning that is also typically associated with nouns: they single out a category of entities that share a common property. In other words, when we refer to “the wealthy,” we single out a category of individuals that share the property of being wealthy, be they tall or short, young or old.

Developmental Consequences?

What are the developmental consequences of this phenomenon? In languages like Spanish, where *det-A*'s are frequent, there is considerable overlap in the surface constructions in which nouns and adjectives appear, and in the extensions for these constructions. Do children acquiring such languages have more difficulty distinguishing nouns from adjectives? This question has been the focus of recent investigations with infants raised in either Spanish or English monolingual environments. By 21–23 months of age, infants acquiring English successfully extend adjectives—but not nouns—on the basis of property-based (e.g., color, texture) commonalities (Waxman & Markow, 1998). Infants acquiring Spanish reveal this link between adjectives and object properties between 23–29 months; whether this link is available earlier is currently under investigation (Waxman & Weisleder, 2007). In any case, the currently available evidence reveals that although it may be more difficult for infants acquiring Spanish than English to tease adjectives apart from nouns, once they do tease them apart (by 29 months at the very latest), infants acquiring either language establish a link between adjectives and object properties.

We suspect that this link to properties is the primary, or preferred, link for adjectives (Dixon, 1982), but we also suspect that it may not be the only one. Perhaps experience with Spanish (where *det-A* constructions are ubiquitous) will lead children to expect that adjectives may be linked to *either* property-based *or* category-based commonalities, but that experience with English will steer the acquisition process along a slightly different developmental course, leading children to expect that adjectives are linked to property-based, *but not* category-based commonalities.

To test this hypothesis, WSB examined young children's extensions of novel words presented as nouns vs. adjectives. Monolingual children acquiring either English, French, or Spanish "read" through a picture book with an experimenter (a native speaker of the child's language). On each page, there were 5 pictures: a target (e.g., a cow), two category-based alternatives (e.g., a fox and a zebra), and two thematic alternatives (e.g., a barn and milk). Children were randomly assigned to one of three conditions. In the No Word condition, the experimenter pointed to the target and said, "See this? Can you find another one?" In the Novel Noun condition, she said, for example, "See this *fopin*? Can you find another *fopin*?" In the Novel Adjective condition, she said, for example, "See this *fopish* one? Can you show me another one that is *fopish*?" The child and experimenter "read" through the book two times. On the second reading, the experimenter reminded the children of their first choices and asked them to select another from the remaining (3) alternatives.

When they were presented with novel nouns, children acquiring English, French, or Spanish were expected to select the category-based alternatives. However, performance in the context of novel adjectives was expected to vary systematically as a function of language. Consistent with these predictions, children in the Novel Noun conditions consistently selected the category-based alternatives in all three languages. However, performance in the Novel Adjective condition varied systematically across languages. Children acquiring French and English performed at chance, suggesting that, for them, adjectives were linked to neither category-based nor thematic relations. In contrast, children acquiring Spanish revealed a different pattern, consistently selecting the category-based alternatives in the Novel Adjective condition, as they had in the Novel Noun condition. This suggests that experience with their native language led children acquiring Spanish, but not English or French, to link adjectives as well as nouns to category-based commonalities. Although Spanish-speaking children's selection of the category-based alternatives was less pronounced in the Novel Adjective than the Novel Noun condition, it was nonetheless quite robust, holding up in children ranging from 3 to 7 years of age.

Perhaps most interestingly, Spanish-speaking children's extension of novel adjectives to the category-based alternatives held up when the adjective was presented in several different constructions, whether it was presented in conjunction with an overt noun (e.g., *la cosa pequena*, lit. the thing little) or whether it was presented in *det-A* phrases in which the noun was dropped from the surface of the utterance (e.g., *la pequeña*, lit. the little [one]). Thus, even when the novel word was presented in a context that was unambiguously adjectival (e.g., when it modified an overt noun *cosa*), and fully comparable on the surface to the constructions presented in English and French, Spanish-speaking children consistently selected the category-based alternatives. WSB interpreted this finding as evidence that experience with different languages does indeed lead children to establish different tacit expectations regarding the use of adjectives.

This is a strong claim and it makes a clear prediction: that children acquiring any language where *det-A*'s are prevalent will demonstrate a different pattern of extension for novel adjectives than children acquiring a language where such constructions are infrequent. This prediction currently rests on cross-linguistic evidence from three languages, two of which behave in one way (English and French), but only one of which behaves differently (Spanish). On the basis of this evidence, it is reasonable to ask whether the pattern exhibited by Spanish-acquiring children is a spurious one or whether it is indeed tied to grammatical features of the language being acquired. To answer this question, what is required is to identify another language in which adjectives behave as they do in Spanish, and then examine how children acquiring this

language extend novel adjectives. If children's expectations regarding the use of novel adjectives is really tied to the grammar of their native language, then children acquiring another language like Spanish should develop an expectation that novel adjectives may be linked to category-based, as well as property-based, commonalities. In the absence of such converging cross-linguistic evidence, the theoretical claim concerning adjective use and acquisition stands on tentative ground.

In the current experiments, we focused on children acquiring Italian. Italian serves as an ideal test case because like Spanish, it has rich grammatical gender and number agreement, the agreement markings are overt, and (perhaps as a consequence) *det-A* constructions are ubiquitous.¹ In Experiment 1, we examined the input that young Italian-acquiring children receive from their parents about adjectives. Our goal was to discover whether *det-A*'s are in fact present in the speech to young children and whether, in addition to *det-A*'s, parents introduce adjectives in contexts that are unambiguously adjectival. In Experiment 2, we conducted an experiment patterned after WSB. Our goal was to test the hypothesis that Italian-speaking children, like their Spanish-speaking counterparts, come to expect that category-based extensions are within the realm of *either* adjective *or* noun use.

EXPERIMENT 1

Although linguistic analyses suggest that *det-A* constructions are widely used in Italian, we are not aware of any empirical evidence regarding their availability in the input to children in any language. We therefore designed a corpus analysis to identify the constructions in which Italian-speaking parents present adjectives to their young children. We asked whether parents introduce adjectives in constructions in which their grammatical status is unambiguously adjectival. This is important because this type of input would support children's ability to tease apart the grammatical form *adjective* from *noun*. We also asked whether the parents introduce adjectives in *det-A* constructions. This is important because these are the constructions that could lead children to discover that there are contexts in which adjectives may be recruited to convey category-based commonalities.

Method and Results

We selected eight corpora from the CHILDES database (MacWhinney, 2000) in which Italian-speaking caregivers interacted with children ranging in age from 16 to 40 months.² This yielded a total of 3054 uses of adjectives in adult utterances (see Appendix A for details). We also selected three corpora from the CHILDES database in which English-speaking caregivers interacted with children in the same age range. This smaller selection, which yielded a total of 546 adult adjective uses, was included as a point of comparison.³

¹We do know, however, that the evidence for S-drop is abundant in the input to Italian- and Spanish-speaking children (Valian, 1990).

²The Italian corpora originated from three sources (Cipriani et al. 1989; Antelmi, 1997; Volterra, 1984).

³The English corpora originated from three sources (Brown, 1973; Kuczaj, 1977; Sachs, 1983).

We first categorized all of the parental utterances that included an adjective as either unambiguous (if only an adjective could be used in that position in that utterance) or ambiguous (if either an adjective or a noun could be used in that position in that utterance). We found that, 68% of the Italian parental uses were unambiguously adjectival. In contrast, in English, 94% of parental uses were unambiguously adjectival. Thus, Italian-speaking parents, like English-speaking parents, favor constructions that provide unambiguous information concerning grammatical status in conversations with their young children, although it is not uncommon for Italian-speaking parents to present adjectives in ambiguous contexts. This confirms that Italian-speaking children are exposed to the kind of linguistic input that could support the identification of adjectives as a distinct grammatical form.

We then considered the subset of unambiguous utterances in which the adjective was used attributively to modify an overt noun (e.g., “the pretty thing” or “a yellow cup”). In the Italian corpora, in 98% of these uses, the adjective modified a lexically specific head noun (e.g., the red horse) rather than a generic term (e.g., *cosa*; the red thing). In English, the comparable figure is 84%; this includes the generic terms *thing* (e.g., the red thing) and *one* (e.g., the red one). This confirms that Italian-speaking children hear adjectives in precisely the kinds of constructions that support their ability to interpret an adjective as modifying a noun (Mintz & Gleitman, 2002).

Finally, we focused on *det-A* constructions, the construction where we expected that Italian-speaking parents might differ from English-speaking parents. To do so, we considered the subset of utterances in which an adjective occurred in the context of a determiner (974 utterances), whether or not the utterance contained an overt noun. Thus, this analysis included *det-A* constructions and *det-A-N* constructions, but excluded utterances in which adjectives occurred in copular sentences (e.g., “this is pretty”) or occurred alone (“pretty!”). Within this subset, *det-A* constructions constituted 27% of the utterances. In English, the comparable figure is 1%, suggesting that the constructions are vanishingly rare. This confirms that Italian-speaking parents do indeed produce *det-A* constructions in conversation with their young children and that children hear adjectives in constructions that are identical on the surface to those for nouns. In principle, then, Italian children have access to the kind of input that could lead them to expect that category-based extensions are within the realm of adjective use; English children do not.

EXPERIMENT 2

Armed with this descriptive evidence, our next goal was to consider Italian-speaking children’s interpretations of novel words presented as either nouns or adjectives. We adapted WSB’s paradigm to address this goal. Our predictions were straightforward: Children in the No Word control condition should perform at chance levels and those in the Novel Noun condition should select the category-based alternatives. At issue was whether Italian-speaking children, like their Spanish-speaking counterparts, would also select the category-based alternatives in the Novel Adjective condition. Importantly, the novel adjectives were not presented in *det-A* constructions, because children acquiring Italian could reasonably interpret the novel word as either a noun or an adjective. As a result, if they did indeed extend the novel word to a category-based alternative, it would be impossible to interpret their patterns of performance. Instead, the novel adjectives were always presented in utterances that were unambiguously adjectival, within

attributive frames that included a determiner, a novel adjective, and an overt lexically specified noun.

Method

Participants

Ninety monolingual Italian-speaking children participated, including 45 3-year-olds (mean age 3;5, 3;1 to 4;0) and 45 5-year-olds (mean age 4;5, 4;1 to 5;0). All were enrolled in day care centers serving a middle-class population in Milan, Italy. All were tested by a native Italian speaker. Approximately equal numbers of males and females were assigned to each condition (below).

Stimuli

Stimuli were black-and-white line drawings, each approximately four cm high. See Table 1 for a complete list of visual stimuli. These were arranged in a book, with five pictures on each page. The center picture on each page served as the “target”; the four surrounding pictures were “response” stimuli. Two response stimuli were from the same object category as the target; the remaining two were thematically related to the target. There were 12 such pages; each page constituted a trial. The position of the taxonomic and thematic choices on each page was counterbalanced over trials.

Procedure

Children were tested individually, in a quiet area on their day care center. Fifteen children at each age were randomly assigned to a No Novel Word (control), Novel Noun, or Novel Adjective

TABLE 1
Experiment 2—Complete List of Visual Stimuli

<i>Target</i>	<i>Category-based responses</i>		<i>Thematic responses</i>	
bird	penguin	swan	nest*	bird cage*
blouse	dress	skirt	suitcase	washing machine
car	bus	bicycle	key	traffic light
horse	pig	sheep	barn*	cowboy*
banana	apple	lemon	boy	monkey
flower	plant	tree	bee	vase
sailboat	airplane	motorcycle	sailor	swimmer*
dog	zebra	bear	dog house	dog bone
bed	couch	chair	star & moon*	toothbrush
fish	seal*	alligator*	fishing pole*	aquarium*
cow	cat	giraffe	milk	barn
candy*	cake	ice cream	fork	baker-man*

*These items were produced in our laboratory. All others were selected from Snodgrass and Vanderwart (1980).

condition (each is described below). The procedure lasted approximately 15 minutes and was conducted entirely in Italian (English translations appear in parentheses).

The experimenter introduced children in all conditions to a hand puppet named Camilla, explaining that the puppet came from another country and wanted to show the child some pictures, but could not speak Italian. (“Camilla viene da un paese lontano e non conosce la nostra lingua”). She explained that the puppet had her own “special” words for things.

No Novel Word condition. In this control condition, no object labels (either familiar or novel) were offered in conjunction with the pictures. For each trial, the experimenter pointed to the target item and said, “Camilla mi ha detto di farti vedere questo. Ora mi fai vedere tu un’altra cosa?” (“Camilla told me to show you this. Now can you show me another thing?”) Children were instructed to indicate their choices by pointing. After completing 12 trials, the experimenter went through the book a second time to elicit second choices on each page. For example, she would say, “Ti ricordi che ti ho fatto vedere questo (experimenter points to target) e tu mi hai fatto vedere questo (experimenter points to child’s previous choice)? Mi fai vedere un’altra cosa ancora?” (Remember that I showed you this and you showed me this? Can you show me another thing again?) The goal in this condition was to pose a neutral request that would permit us to examine how children would perform in the absence of a novel word.

Novel Noun condition. Instructions in this condition were identical to those in the No Novel Word condition, with one exception: As the experimenter pointed to each target item, she labeled it twice with a nonsense noun, using a different novel noun for each trial. (See Table 2 for a complete list of novel words.) For example, the experimenter would say, “Camilla mi ha detto che questo/a è un/una *fapole*. Mi fai vedere un/an’altro/a *fapole*?” (Camilla told me that this is a *fapole*. Can you show me another *fapole*?) After completing all 12 trials, the experimenter went through the book a second time to elicit second choices on each page. For example, she would

TABLE 2
Experiment 2—Complete List of
Novel Words

<i>Novel Nouns</i>	<i>Novel Adjectives</i>
fapole	foposa
dacope	dacosa
banete	banosa
sacale	sacosa
bicone	bicosa
migane	migosa
sitove	sitosa
romate	romosa
tatene	tatosa
lufene	lufosa
gapafe	gaposa

NB: All nouns end in *e*, which is valid for objects taking either masculine or feminine grammatical gender.

say, “Ti ricordi che prima Camilla mi ha detto che questo/a è un/una *fapole* (experimenter points to target), e tu mi hai detto che questo/a (experimenter points to child’s previous choice) è un/ un’altro/a *fapole*? Mi puoi far vedere un altro *fapole* ancora?” (Remember that earlier Camilla told me that this is a *fapole* and you said that this is another *fapole*? Can you show me another *fapole* again?)

Novel Adjective condition. Instructions in this condition were identical to those in the Novel Noun condition, except that the novel words were presented in adjectival contexts. (See Table 2.) Notice that the adjectives appeared in constructions that marked them unambiguously as adjectives; nouns would not appear in these constructions. To be more precise, the novel adjectives were introduced in conjunction with either the noun *cosa* (first mention, see below) or the clitic pronoun *ne* (second mention). The presence of the clitic *ne* indicates that there is a dropped noun, and in this way, it is functionally equivalent to constructions including *one* in English. Moreover, all adjectives were constructed with the characteristic Italian adjectival suffix, *osa*, and all took the feminine grammatical gender to accord with the noun *thing* (*cosa*). As in the Novel Noun condition, each adjective was mentioned twice per trial. For example, the experimenter pointed to the target saying, “Camilla mi ha detto che questa è una cosa *faposa*. Me ne fai vedere un’altra *faposa*?” (Camilla told me that this is a *fopish* thing. Can you show me another *fopish* one?). After completing all 12 trials, the experimenter went through the book a second time to elicit second choices on each page, saying, for example, “Ti ricordi che prima Camilla mi ha detto che questa è una cosa *faposa* (experimenter points to target) e tu mi hai detto che questa è un’altra cosa *faposa* (experimenter points to child’s previous choice). Me ne puoi far vedere un’altra *faposa*?” (Remember that earlier Camilla told me that this is a *fopish* thing and you said that this is another *fopish* thing? Can you show me another *fopish* [one]?).

Scoring

Children’s first and second choices were recorded for each page (trial). For a first choice, the probability of choosing a category-based (or thematic) alternative is .50. For a second choice where children are essentially sampling without replacement, one must take into account the conditional probability of choosing a particular item given the choices that remain after the first selection. The probability of making consistent category-based (or thematic) selections on both first and second choices is .17 (.50 for the first choice \times .33 for the second choice); the probability of making one category-based and one thematic choice is .33 (.50 for the first choice \times .67 for the second).

Results and Discussion

Figure 1 depicts the proportion of trials in which Italian-speaking children in each condition consistently selected the category-based alternatives on both their first and second trials. The data are comparable in all respects to those obtained previously with the Spanish-speaking sample (Waxman, et al., 1997).

We first compared performance in each condition to chance levels of responding (recall that chance is .17). As predicted, children in the No Novel Word condition ($M = .17$) consistently responded at the chance level. This is important because it indicates that the pictorial stimuli

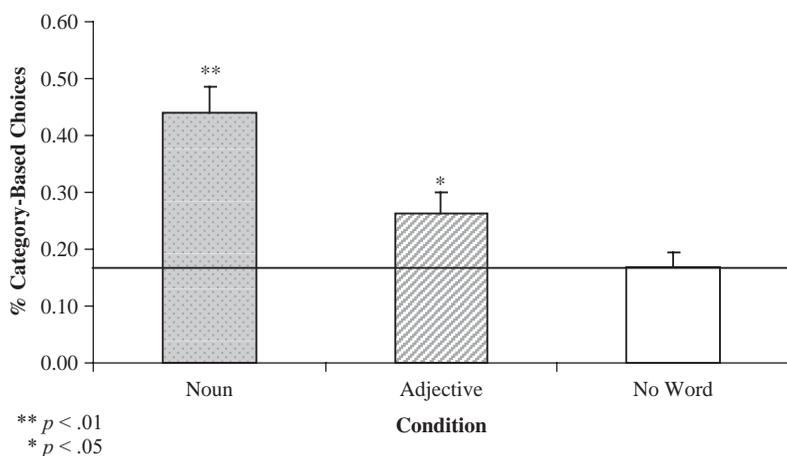


FIGURE 1 Experiment 2. Mean proportion of trials on which children in each condition consistently selected the category-based alternatives on both first and second choices.

themselves were neutral with respect to the task. This insures that any tendency to favor the category-based alternatives in either the Novel Noun and Novel Adjective conditions will be attributable to the introduction of the novel words and not due to the category-based alternatives being more attractive in general. As predicted, children in the Novel Noun ($M = .44$) condition consistently selected both category members more often than would be expected by chance, $t(29) = 5.61, p < .0001$. Importantly, children in the Novel Adjective condition ($M = .26$) also favored the category-based alternatives, $t(29) = 2.68, p = .01$.

This pattern was bolstered by the results of a Condition (3) \times Age (2) between-subjects ANOVA. A main effect for Condition, $F(2, 84) = 13.77, p < .001$, revealed that as predicted, children in both the Novel Noun and Novel Adjective conditions were more likely to select the category-based alternatives than were their age-mates in the No Novel Word condition, Fisher PLSD, both $ps < .05$, one-tailed. Thus, like Spanish-speaking children, Italian-speaking children reveal a consistent tendency to focus on category-based commonalities when presented with novel adjectives as well as nouns. Although this tendency was more pronounced in the Novel Noun condition, it was also reliable in the Novel Adjective condition for children at both 3 and 5 years of age. This echoes the pattern reported in WSB in Spanish (Waxman et al., 1997) and is consistent with the possibility that experience with these languages, where *det-A* constructions are ubiquitous, lead children to expect that adjectives may be linked to either property-based or category-based commonalities

GENERAL DISCUSSION

In the experiments reported here, we consider how children establish links between grammatical form and meaning and whether these links are shaped by the ambient language under acquisition. Although this work represents an empirical contribution, our motivation was largely

theoretical in nature. We took as our starting point WSB's intriguing evidence that for children acquiring either English or French, category-based extensions are within the realm of *only* noun use, but that for children acquiring Spanish, category-based extensions are within the realm of adjective *as well as* noun use (Waxman et al., 1997). WSB attributed these different interpretive patterns to differences in the treatment of adjectives (and to differences in the prevalence of *det-A* constructions, in particular) in English and French, as compared to Spanish.

Our goal in the current experiments was to put this cross-linguistic developmental proposal to test by developing a more detailed linguistic analysis of the phenomenon at hand and by garnering converging evidence in Italian, a language that, like Spanish, freely licenses *det-A* constructions. In Experiment 1, we established that in conversations with their young children, Italian-speaking parents do provide *det-A* constructions, but also introduce adjectives in contexts that are unambiguously adjectival. In Experiment 2, we found that Italian-speaking children favored category-based alternatives when they were presented with adjectives as well as when they were presented with nouns. This convergence between Italian and Spanish, on the one hand, and English and French, on the other, is consistent with WSB's claim that children's expectations for novel adjectives reflect the behavior of adjectives in the ambient language. It provides support for the proposal that experience with Italian and Spanish, two languages in which *det-A* constructions are ubiquitous, lead children to expect that adjectives may be linked to *either* property-based *or* category-based commonalities. This outcome suggests that although there are strong universals in the treatment of adjectives (as well as nouns) across languages, there are also cross-linguistic differences in the treatment of adjectives that appear subtle on the surface, but that nonetheless have developmental consequences.

These results raise several intriguing questions of their own. First, how can we best characterize the differences in children's performance in the Novel Adjective condition across these four languages? Perhaps speakers of all languages will eventually link adjectives rather exclusively to property-based (and not category-based) commonalities, but arriving at this precise expectation requires a more protracted developmental course in languages like Italian and Spanish than in French and English. This is a plausible alternative because after all, the evidence reveals that English-acquiring infants initially extend adjectives broadly to both property- and category-based commonalities, and only later establish a more specific link between adjectives and property-based (but not category-based) commonalities (Waxman, 1999; Booth & Waxman, 2003). Perhaps the overlap between nouns and adjectives (particularly in *det-A* constructions) in Spanish and Italian makes it difficult for children to tease nouns apart from adjectives based on the utterances they hear, or to settle on the distinct patterns of extension for each.

This is an intriguing possibility, but in our view, it does not fully account for the facts. For example, if Italian-speaking children were unable to tease apart the grammatical form *adjective* from *noun*, then they should have performed identically in the Novel Noun and Novel Adjective conditions. Yet this was not the case: Although they favored the category-based alternatives in both the Novel Noun and Novel Adjective conditions, their preference was significantly stronger in the Novel Noun condition, suggesting that they did indeed make progress in establishing this distinction. Second, if performance in the current experiment reflected a delay in the timing of the acquisition function in Italian, then we would expect to find a developmental progression, with the tendency to select the category-based alternatives in the Novel Adjective condition diminishing with age. Yet we found no such progression: Italian-speaking children performed comparably in the Novel Adjective conditions at 3 and 5 years of age. Similarly, Spanish-speaking

children ranging from three to seven years of age performed comparably in the Novel Adjective condition (Waxman, et al., 1997). Third, recent evidence reveals that by 29-months, Spanish-acquiring infants successfully distinguish novel nouns from adjectives, and consistently map adjectives (but not nouns) to property-based commonalities (e.g., color, texture) (Waxman & Weisleder, 2007). The current results indicate that young Italian speakers also map adjectives to category-based alternatives. Taken together, these results suggest that Italian children's performance in the Novel Adjective condition is not the result of a relative delay in the acquisition function in Italian. Instead, these children have established a grammatical category *adjective* and have learned that both category- and property-based commonalities are within its realm. If this interpretation is correct, then adult speakers of Italian and Spanish should also extend novel adjectives taxonomically. It will be important to test this hypothesis in adult populations.

Another intriguing set of questions concern the interplay between the learner and the input she receives. Although in the current work, we have focused specifically on features of the input, we do not mean to imply that the acquisition of grammatical categories in general, or the category *adjective* in particular, are formed on the basis of the linguistic input alone. On the contrary, even in the absence of linguistic input, young deaf children who have acquired their own home sign system establish distinct grammatical categories, and they link one such grammatical category to properties (Goldin-Meadow, 2003; 2004). This achievement, remarkable in and of itself, underscores the importance of considering what structure, if any, is inherent in the learner and how it is tuned by the structure provided in the input. In the work reported here, we focused on the input in an effort to discover how the input (that is, experience with different languages) might shape children's expectations for adjectives.

This discussion also bears on the tension between claims for language-general vs. language-specific influences on acquisition? We have devoted considerable attention to a cross-linguistic difference in adjectives, but we do not mean to suggest that speakers' expectations for adjectives will differ wildly from one language to another. On the contrary, we expect that there are strong universals (some of which may be evident even in the absence of a language model), and that these serve as the foundation upon which cross-linguistic differences exert their impact. In the case of adjectives, universals abound. For example, in all languages that include adjectives, these are semantically and syntactically dependent upon the nouns that they modify. We assume that in all such languages, there will be certain circumstances in which these adjectives can appear in the absence of an overtly mentioned noun, as in *det*-A constructions, but that the prevalence of such constructions will vary.

Perhaps most importantly, we assume (following Baker, 2005 and Dixon, 1982) that in all languages that include adjectives, these will be primarily linked to properties of objects. But in addition to this primary link, we propose that *other* links may also be established for adjectives and that these will be shaped by the treatment of adjectives in the ambient language. We have suggested that in Italian (and Spanish), adjectives are also linked to category-based commonalities. This finding fits well within formal semantics analyses, in which both nouns and adjectives can describe properties of individuals that share some commonality (e.g., the noun "dog" picks out the set of entities that have the property of being dogs; the adjective "red" picks out the set of entities that have the property of being red).

Notice, however, that although we have shown that children acquiring Italian and Spanish will under certain circumstances permit category-based extensions in the context of a novel

adjective, we make no claims about this being their *preferred* interpretation. Instead, we acknowledge that the link from adjectives to property-based commonalities is primary. We therefore predict that if property- and category-based alternatives were both available, children would favor the property-based alternatives (Booth & Waxman, 2003; Klibanoff & Waxman, 2000; Waxman, 1999; Waxman & Klibanoff, 2000; Waxman, 1998).

Summarizing to this point, we have suggested that, against a backdrop of strong universals, there are cross-linguistic differences in the use of adjectives. We have suggested that this difference is reflected in the interpretive strategies adopted by young children acquiring different languages. The current work provides empirical evidence for this link between native language input and children's interpretative strategies. It is worth pointing out, however, that this evidence is correlational in nature; testing the hypothesis that these are causally related will take several additional steps.

One step will be to trace more precisely the relation between the input provided to an individual child and that child's interpretation of particular adjectives. Now that we have established a corpus-based population-wide difference in the behavior of adjectives in Italian vs. English, a next step will be to consider the relation, if any, between the input characteristics for particular adjectives and children's interpretations of those adjectives.

Another step will be to provide a more formal analysis of the linguistic phenomena. A comprehensive examination of the constructions in which adjectives occur (and the prevalence of *det-A* constructions) across languages may bring us closer to articulating whether and how the input contributes to matters of word interpretation. Also important will be a more formal analysis of the semantics of adjectives, a more detailed analysis of the contexts in which N-drop can occur, and a more comprehensive analysis of the mechanisms that license *det-A* constructions across languages. Although it is beyond the scope of this paper to treat these issues fully, we offer a sketch of what some of these analyses might entail.

For example, it will be important to identify the constraints governing *det-A* constructions within a given language. This is important because whether and how a language admits the *det-A* construction is relevant not only for learning words, but also for acquiring grammar. There is broad agreement that *det-A* constructions are productive phenomena governed by syntactic or grammatical features (as Waxman et al., 1997, argued for Spanish and as Gleitman, 1961, Bernstein, 1993 and Torrego, 1987, have argued). But there has been active debate as to which syntactic feature actually governs *det-A* constructions. Some have claimed that it is governed by a broad syntactic phenomenon which includes subject drop (S-drop; Torrego, 1987). It follows from this position that S-drop and N-drop are essentially linked, and that if a language permits S-drop, then it must also permit N-drop. Others have argued that S-drop and N-drop are distinct syntactic phenomena (Bernstein, 1993). It remains to be seen whether and how this influences children's interpretations about word meaning. To gain leverage on these issues, a broad cross-linguistic input analysis of S-drop, N-drop, and *det-A* constructions in child-directed speech will be essential. Such an analysis will also help to determine the frequency with which *det-A* constructions are produced by adults and children acquiring various languages and to discern the kinds of meaning that are conveyed in cases where they do.

It will also be important to specify with greater detail the mechanisms that license *det-A* constructions across languages. We know that *det-A* constructions are a consequence of a broader linguistic phenomenon (elision of a category) and that their prevalence varies across languages.

Our analysis of *det*-A constructions is based on two assumptions: First, that *det*-A constructions are NPs (or more accurately DPs [determiner phrases] that contain an NP within them; Abney, 1987), and second, that the dropped noun is represented by a null pronominal category, *pro*. Following in the spirit of Gleitman (1961), Kester (1996), and Lobeck (1995), we have been suggesting that *pro* may be formally licensed by agreement features (see Baker, 2005, for the idea that agreement is crucial for licensing empty categories). Other authors (Merchant, 2001; Corver & van Koppen, 2006) have claimed that *pro* is licensed by focus features. Although these two views are presented as alternatives, a possibility that needs to be explored is that both options are available. That is, perhaps in Italian and Spanish, where grammatical agreement is overtly marked, *pro* is primarily licensed by agreement features, but in English and French, where grammatical agreement may be unmarked or inaudible in speech, *pro* may also be licensed by focus features. In future work, we plan to pursue the possibility that the manner in which a construction is licensed affects its interpretation, and perhaps the course of its acquisition.

Before closing, a few caveats are in order. We are not suggesting that the grammatical categories *noun* and *adjective* are any less distinct in languages like Italian and Spanish than in English or French. What we are suggesting is that there is a certain type of extension that is within the realm of *either* adjective *or* noun use in Italian and Spanish, but *only* within the realm of noun use in English and French. Finally, we do not mean to imply that there are no interesting distinctions between French and English on the one hand, or between Italian and Spanish on the other. Rather, for the questions we have addressed here, we have treated the languages within each pair as comparable and have shown that children acquiring English and French appear to interpret adjectives similarly, and in a way that differs subtly but reliably from the interpretations of their counterparts acquiring Italian and Spanish.

Ultimately, this work must be situated within the broader context of research on acquisition. We have proposed that infants embark upon the task of word learning with a broad initial expectation linking novel words (either nouns or adjectives) to sets or commonalities among entities (either category- or property-based). We have proposed that this initial expectation is shaped by experience with the language under acquisition and that this experience leads to a more specific set of expectations linking particular grammatical forms to particular types of meaning. The difference that we have discussed here emerges at this juncture. For children acquiring English or French, experience leads to children to build an expectation that category-based commonalities are within the realm of noun (but not adjective) use. For children acquiring Italian and Spanish, experience steers the acquisition process along a slightly different developmental course, permitting them to build an expectation that category-based commonalities are within the realm of both noun and adjective use.

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APPENDIX

The examples below provide a glimpse of the examples in which *det-A* constructions are licensed in (a) English, (b) French, (c) Spanish, and (d) Italian. As we have pointed out, *det-A* constructions are more prevalent in the latter two than the former two languages. Moreover, in Spanish and Italian, *det-A* constructions may occur with the definite or indefinite article and the dropped noun in these constructions may be applied to entities that are either human or not human, singular or plural, specific or generic.

- | | |
|--------------------|---------------------|
| (1) a. the poor | (4) a. *the smooth |
| b. les pauvres | b. *le lisse |
| c. los pobres | c. el suave |
| d. I poveri | d. il tranquillo |
| (2) a. *a poor | (5) a.* the asleep |
| b. une pauvre | b. *l'endormie |
| c. un pobre | c. el dormido |
| d. un povero | d. l'addormentato |
| (3) a. *three poor | (6) a. *the careful |
| b. trois pauvres | b. *les prudents |
| c. tres pobres | c. los cuidadosos |
| d. tre poveri | d. i prudenti |