

# A Cross-Linguistic Examination of the Noun-Category Bias: Its Existence and Specificity in French- and Spanish- Speaking Preschool-Aged Children

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Previous research has revealed that English-speaking preschoolers expect that a novel count noun (but not a novel adjective), applied to an individual object, may be extended to other members of the same basic or superordinate level category. However, because the existing literature is based almost exclusively on English-speakers, it is unclear whether this specific expectation is evident in children acquiring languages other than English. The experiments reported here constitute the first cross-linguistic, developmental test of the noun-category linkage. We examined monolingual French- and Spanish-speaking preschool-aged children's superordinate level categorization in a match-to-sample task. Target objects were introduced with (a) novel words presented as count nouns (e.g., "This is a *fopin*"), (b) novel words presented as adjectives (e.g., "This is a *fopish* one"), or (c) no novel words. Like English-speakers, French- and Spanish-speakers extended count

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nouns consistently to other category members. This is consistent with our prediction that the mapping between count nouns and object categories may be a universal phenomenon. However, children's extension of novel adjectives varied across languages. Like English-speakers, French-speakers did not extend novel adjectives to other members of the same category. In contrast, Spanish-speakers did extend novel adjectives, like count nouns, in this fashion. This is consistent with our prediction that the mappings between adjectives and their associated applications vary across languages. The results provide much-needed cross-linguistic support for the noun-category linkage and illustrate the importance of the interplay between constraints within the child and input from the language environment.

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In recent years, there has been renewed interest in questions concerning the relations between language and cognition. This renewal has been buoyed by two streams of research: a rekindling of interest in this issue within cognitive psychology and a burgeoning appreciation of the influence of culture and its artifacts (including language) in shaping human conceptual systems (see, for example, Hunt & Agnoli, 1991). In addition, because innovative techniques have enabled researchers to examine the early acquisition of linguistic and conceptual systems of organization, much research in this area has adopted a distinctly developmental focus. In particular, researchers have begun to investigate the hypothesis that there are powerful and precise linkages between the linguistic and conceptual systems of organization in the developing child.

Recent research on the relation between word learning and conceptual organization serves as a case in point. There is now broad consensus that infants and young children direct their attention differently in the context of learning a novel word than in other, non-linguistic tasks. More specifically, the data reveal that English-speaking children as young as two or three years of age expect that particular linguistic units (e.g., count nouns, adjectives, verbs) will refer to particular types of conceptual relations among objects and events in the world (e.g., categories of objects, properties of objects, and the actions in which they are engaged, respectively) (Brown, 1957; Hall, 1993, 1994, 1996; Hall, Waxman, & Hurwitz, 1993; Waxman, 1990, 1994; Waxman & Kosowski, 1990).

One of the most robust findings to emerge from this literature is that preschool-aged speakers of English expect that a novel count noun applied to an individual object will refer to that object and to other members of the same basic or superordinate level category of objects (D'Entremont & Dunham, 1992; Markman & Hutchinson, 1984; Waxman, 1990; Waxman & Gelman, 1986; Waxman & Kosowski, 1990). We refer to this specific expectation as the *noun-category* bias (e.g., Waxman, 1991; Waxman & Kosowski, 1990; Waxman & Markow, 1995).<sup>1</sup> By 2 or 3 years of age, this expectation is

<sup>1</sup> We describe the phenomenon as the *noun-category* bias rather than the *taxonomic* bias (e.g., Markman, 1994) to highlight the fact that the tendency to focus on categories of objects is evident specifically with novel words presented as count nouns.

specific to count nouns: Although adjectives and proper nouns can also be sensibly applied to individual objects, children's interpretations of novel words presented in these syntactic contexts are quite different. They interpret a novel proper noun applied to an individual as referring specifically to the named individual, and do not extend the term to include other members of its kind (Gelman & Taylor, 1984; Hall, 1994, 1996; Katz, Baker, & Macnamara, 1974); they interpret a novel adjective as referring to a property of the named individual or to a salient subordinate level distinction within the basic level kind (Hall, Waxman, & Hurwitz, 1993; Taylor & Gelman, 1988; Waxman, 1990). Findings like these reveal that preschool-aged children are sensitive to syntactic distinctions (e.g., count noun, proper noun, adjective) and expect that the syntactic form of a novel word, applied to an individual, provides information regarding its meaning.

This line of research has received considerable attention, in part because it constitutes empirical support for the claim that there are abstract linkages between syntax and semantics (cf., Chomsky, 1965; Gleitman, 1990). This line of research has often been interpreted as evidence that the early acquisition of knowledge is guided by tacit constraints or principles. With respect to the issues at hand, the claim is that despite young children's well-documented conceptual flexibility, there are constraints on the possible set of interpretations that children will consider when mapping a novel word to its meaning. For example, a tacit expectation that a novel count noun (e.g., an *octopus*) will refer to a particular named object and may be extended to other members of its kind (e.g., other octopi), reduces the likelihood that the novel word could refer to salient thematic relations involving that object (e.g., an octopus along with its prey), to salient properties of the object (e.g., its suction pads or unusual color), or to salient actions in which it is engaged (e.g., squirting ink). In this way, constraints on word meaning help to resolve the logical difficulty inherent in word learning (cf., Markman, 1994; Waxman, 1994; Quine, 1960).

There is, however, a serious limitation in the research conducted thus far. Although the empirical support for the noun-category linkage is quite robust, it is derived almost exclusively from English-speaking preschool-aged children.<sup>2</sup> Research based on this population has led to important insights. Nonetheless, this population alone provides an insufficient basis for addressing questions concerning the developmental origins and universality of the noun-category linkage. To address this question, two types of evidence must be marshalled. First, to ascertain whether this linkage is in place at the onset of lexical acquisition or whether it emerges later, perhaps as a consequence of language learning itself, it is important to examine its emergence from infancy through the preschool years. Second, to ascertain whether this linkage might be universal, or whether

<sup>2</sup> Although there have been several recent reports of innovative cross-linguistic developmental work (Au, Dapretto, & Song, 1994; Imai & Gentner, 1994; Gopnik & Choi, 1990; Naigles, Eisenberg & Kako, 1992; Sera, 1992), these have addressed different aspects of the question.

it varies as a function of the particular language under acquisition, it is crucial that we examine children acquiring languages other than English.

In the experiments reported here, we address these issues, focusing specifically on the linkage between count nouns and superordinate level object categories in preschool-aged monolingual children acquiring either French (Experiment 1) or Spanish (Experiments 2 and 3) as their native language. This focus was motivated by both developmental and cross-linguistic evidence suggesting the noun-category linkage is likely to play a substantial role early in development and across languages. A summary of this evidence sets the stage for the specific research questions addressed here.

### *Developmental Evidence*

As we have indicated, there is converging evidence that English-speaking preschool-aged children interpret novel count nouns as referring to categories of objects at the basic and superordinate levels. To illustrate this phenomenon, we describe one representative method in detail, for this method serves as the foundation for the cross-linguistic work reported here. In a match-to-sample task, Waxman and Kosowski (1990) compared the influence of introducing either novel nouns, novel adjectives, and no word controls on English-speaking children's tendency to form superordinate level object categories. Preschoolers in this task "read" a picture book with an experimenter. On each page, there were 5 pictures: a target (e.g., a cow), two taxonomic alternatives (two objects from the same superordinate category as the target, e.g., a fox and a zebra), and two thematic alternatives (two objects that were thematically related to the target, e.g., a barn and milk).

Children participated in 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 three alternatives.

If children expect that count nouns refer to superordinate level object categories, then children in the Novel Noun condition should be more likely than those in the Novel Adjective and No Word conditions to select other category members. The results supported this prediction entirely. Only in the Novel Noun condition did children consistently select other members of the superordinate level categories; neither the Novel Adjective nor the No Word control conditions had this effect. Children in the latter two conditions performed at chance.

Notice that this experimental design incorporates two distinct types of control for the Novel Noun condition. Performance in the No Word control reveals whether children are more likely to direct their attention to categories of objects in the context of word learning, as compared to a non-linguistic control task.

Performance in the Novel Adjective condition also serves as a crucial control, permitting us to test the specificity of the linkage by asking whether the effect is specific to novel words presented as count nouns. The power of the Novel Adjective condition as a control derives from syntactic as well as semantic distinctions between nouns and adjectives in English. (See, e.g., Kester (1994) for a syntactic analysis and Wierzbicka (1986) for a semantic analysis.) Syntactically, in English, adjectives and count nouns have distinctive distributions or privileges of occurrence. Therefore, although both count nouns and adjectives can be sensibly applied to individual objects, the syntactic frames in which the novel word are introduced provide unambiguous evidence of its intended syntactic assignment (e.g., "This is a *fopin*" vs "This is a *fopish* one"). Moreover, as we have noted, words from these two distinct syntactic categories yield different types of interpretations for English speakers. By age three, children acquiring English are sensitive to these syntactic as well as semantic considerations. With regard to syntax, they distinguish novel words presented as nouns from those presented as adjectives; with regard to semantics, they interpret novel words presented as nouns, but not as adjectives, as referring to categories of objects (Waxman & Kosowski, 1990).

To discover the developmental antecedents of this phenomenon, Waxman and her colleagues have examined infants who are at the threshold of acquiring English. The data suggest the infants share with preschool-aged children an expectation that novel nouns will refer to object categories. For infants ranging from 9 to 15 months of age, novel words (e.g., "See the *fopin*?") highlight commonalities among objects and facilitate the formation of object categories at the basic and superordinate level (Balaban & Waxman, 1997; Waxman & Balaban, 1995; Waxman & Hall, 1993; Waxman & Markow, 1995). This is important because it indicates that this expectation is available to guide infants in their first efforts to map words to meaning; it also suggests that there is continuity over development in the interpretation of novel count nouns.

In contrast to the continuity in expectations concerning novel nouns, there appears to be developmental change in the interpretation of novel adjectives. As Waxman and Kosowski (1990) have shown, preschool-aged English speakers do not extend novel adjectives to refer to object categories. However, at 12- and 13 months, a different pattern is apparent: Novel words presented either as count nouns or as adjectives direct infants' attention to object categories (Waxman & Markow, 1995).<sup>3</sup> Thus, for children acquiring English, expectations concerning the interpretations associated with the grammatical category *adjective* undergo change over development.

These results illustrate two complementary points. First, they offer empirical support for the view that word learning unfolds under the influence of some initial expectations or interpretive biases within the child. In particular,

<sup>3</sup> The source of this initial pattern is currently under investigation (see Waxman and Markow (1995) for a thorough discussion of possible interpretations).

it appears that infants begin the process of lexical acquisition equipped with an initial expectation that novel words (presented either as nouns or adjectives) applied to objects will refer to categories of objects. Second, these findings reveal a substantial role for language-specific learning. In the initial phases of word learning, infants do not distinguish novel nouns from adjectives in object categorization tasks. This functional distinction between count nouns and adjectives appears to emerge later, once the process of lexical acquisition is well underway (Waxman, 1995).

### *Cross-Linguistic Evidence*

This developmental pattern converges well with cross-linguistic examinations of the grammatical categories, *noun* and *adjective*. Across languages, the grammatical category *noun* is remarkably stable. According to Dixon (1979, p. 1) “(I)t is an empirical fact that there is always a major class that is aptly called Noun: there is never any doubt as to the applicability of this traditional label, and never any doubt as to which class should be called Noun.” Across languages, the grammatical category *noun* includes terms for referring to objects and categories of objects (Brown, 1984, 1986; Berlin, 1992; Goldin-Meadow, Butcher, Mylander, & Dodge, M., 1994; Lyons, 1977; Wierzbicka, 1986).<sup>4</sup> This canonical and universal function of nouns is implicit in most current psycholinguistic theories of acquisition (Gleitman, 1990; Grimshaw, 1994; Maratsos, 1991; Pinker, 1994). Moreover, many recent theories share the assumption that (a) the grammatical category *noun* may be acquired prior to other grammatical categories and that (b) the mappings between nouns and their meanings may be established via different mechanisms than the mappings between other grammatical forms and meaning (cf., Gentner, 1982; Gleitman, 1990; Maratsos, 1991; Tomasello, 1992).

This cross-linguistic and developmental stability of the grammatical category *noun* contrasts sharply with the variability associated with the grammatical category *adjective*. In addition to the pattern of developmental change described above, there is considerable cross-linguistic fluctuation concerning this syntactic category (Dixon, 1982). First, languages vary widely in the extent to which a grammatical category *adjective* is developed (Dixon, 1982). For example, Igbo (from the Kwa subgroup of the Niger–Congo family) has a total of 8 adjectives, Hausa has 12, and Bantu languages have adjective classes ranging from ten to fifty words. Second, languages vary as to what aspects of experience will be conveyed with an adjective as opposed to another grammatical form (Gentner, 1982; Talmy, 1985). This variability is important, for in languages with sparse adjective systems, the aspects of experience conveyed by adjectives in languages

<sup>4</sup> This is not to say that it is the sole function of nouns to refer to objects and object categories. Clearly, nouns may serve other functions as well. For example, in English, nouns may modify other nouns directly (e.g., *a coffee cup*, *a paint bucket*) and they may refer to abstract entities (e.g., *an idea*, *the hypothesis*). The point here is that referring to object categories is a core and likely universal function of this grammatical category.

like English, French, or Spanish must be conveyed by other grammatical forms, such as nouns and verbs (Dixon, 1982; Maratsos, 1991). Thus, the mappings between adjectives and their associated meanings are neither uniform across development nor across languages.

Taken together, these cross-linguistic and developmental observations motivate the series of experiments reported here in which we examine the existence and specificity of the linkage between count nouns and object categories in monolingual children acquiring either French (Experiment 1) or Spanish (Experiments 2 and 3). On the basis of these cross-linguistic and developmental observations, we propose that a linkage between count nouns and object categories, which emerges early in English-speaking children and appears to be evident across human languages, may be a universal phenomenon (Gentner, 1982; Gleitman, 1990; Maratsos, 1991; Pinker, 1994; Waxman, 1994; Waxman & Markow, 1995). If this is the case, then the noun-category linkage should be evident in all children, independent of the particular language they are acquiring. As a corollary, we predict that the specific mappings between adjectives and their associated interpretations, which appear to emerge later in development, may vary systematically as a function of the language under acquisition (Dixon, 1982; Waxman & Markow, 1995; Wierzbicka, 1986). These hypotheses underscore the necessity of cross-linguistic developmental work. (See Slobin, 1985, for an insightful and thorough discussion.)

We adapted the five-item match-to-sample categorization procedure developed by Waxman and Kosowski (1990) to accommodate these different language communities. Native speakers (bilingual in English) translated the English protocol into either French or Spanish. These native speakers also served as experimenters. In addition, we made modifications in the pictures presented to the children from each language community. There were two motivations underlying our item selection: (a) to ensure that the pictures included in the task represented objects that were familiar to children growing up in each locale and (b) to permit an examination of the potential influence of grammatical gender on children's interpretation of novel words. In both French and Spanish, as opposed to English, there are two grammatical genders (masculine and feminine). These are marked morphologically on the nouns, and the adjectives and determiners show gender concord with their nouns. Grammatical gender can refer to "real world" gender (e.g., in French: *une femme* (a woman, feminine gender), *un homme* (a man, masculine gender)), but for the most part it is an arbitrary grammatical designation (e.g., in French: *une voiture* (a car, feminine gender), *un train* (a train, masculine gender)). (See Berman, 1985; E. Clark, 1985; Karmiloff-Smith, 1979; Levy, 1983; Perez-Pereira, 1991, for evidence regarding preschool-aged children's acquisition of these arbitrary grammatical gender designations.<sup>5</sup>)

<sup>5</sup> To examine any potential influence of grammatical gender on children's performance in this categorization task, we created two different kinds of trials: gender-consistent and gender-mixed trials. On the gender-consistent trials, we included only items whose basic level labels shared a

Another, more consequential, difference between the English, French, and Spanish languages warrants more detailed discussion. We selected French and Spanish because we were able to develop access to populations of preschool-aged monolingual native speakers. We also noticed that despite the many similarities between these two closely-related languages, there are differences between them with regard to the grammatical category *adjective*. These differences led us to suspect that performance in the Novel Adjective control condition might vary systematically as a function of the language under acquisition.

Recall that the Waxman and Kosowski task incorporated both a No Word control (to determine whether children are more likely to direct their attention to categories of objects in the context of word learning, as compared to a non-linguistic control task) and a Novel Adjective control (to determine whether this effect is specific to nouns). English-speaking children revealed that they (a) distinguished the novel words presented as nouns from those presented as adjectives on the basis of the syntactic information provided by the experimenter and (b) interpreted nouns, but not adjectives, as referring to objects and categories of objects.

However, Spanish differs from English (and French, see below) in both (a) the syntactic contexts in which adjectives can appear and (b) the semantic functions associated with the grammatical category *adjective*. Spanish exhibits highly productive syntactic phenomenon in which nouns are dropped from within certain expressions (Wonder, 1981; Snyder, 1995; Kester, 1994). As a consequence, adjectives in Spanish are permitted to appear in phrases consisting of a determiner followed by an adjective, with no overt noun. (The determiner and adjective retain gender and number concord with the “dropped” noun.)

As is evident in examples (1) through (6), presented in (a) English, (b) French, and (c) Spanish (examples 5 and 6 adapted from Wonder, 1981), this highly productive, lexically unrestrictive process is pervasive in Spanish.<sup>6</sup>

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common grammatical gender designation. On these pages, because we eliminated the possibility that children could select items on the basis of grammatical gender, the task was wholly comparable to that confronting the English-speaking subjects in previous work (cf., Waxman & Kosowski, 1990). On the gender-mixed trials, we varied the grammatical gender of the items, selecting one thematic and one taxonomic alternative that matched the target in grammatical gender, and one thematic and one taxonomic alternative that conflicted with the target in grammatical gender. Notice that on these trials, it was possible for children to select objects on the basis of gender agreement. Therefore, if children were to select on the basis of taxonomic relations, they would have to overlook grammatical gender to do so. Thus, these gender-mixed trials allowed us to examine whether children in the Novel Noun condition would override grammatical gender to select both of the taxonomically-related category members.

<sup>6</sup> In Spanish, practically any adjectival form (including verbal and participle forms) can appear alone with a determiner, just as a count noun normally does. The “dropped” noun in these expressions can be either human or not human, singular or plural, specific or generic. Its interpretation is often roughly equivalent to the English “type” or “one.” There are competing explanations for this det-A construction. Some linguists describe it as the product of a process of noun



- |     |  |     |  |
|-----|--|-----|--|
| (1) | a. the poor<br>b. les pauvres<br>c. los pobres       | (4) | a. *the smooth<br>b. *le lisse<br>c. el suave            |
| (2) | a. *a poor<br>b. une pauvre<br>c. un pobre           | (5) | a. *the asleep<br>b. *l'endormie<br>c. el dormido        |
| (3) | a. *three poor<br>b. trois pauvres<br>c. tres pobres | (6) | a. *the careful<br>b. *les prudents<br>c. los cuidadosos |

These determiner–adjective (det-A) constructions are intriguing because although the adjectives in these constructions retain their syntactic assignment as adjectives,<sup>7</sup> they can appear in syntactic frames that are identical to those for count nouns. Moreover, these det-A constructions appear to adopt a semantic function that is customarily associated with count nouns: they typically refer to the named object and to other members of that object category.

With regard to acquisition, children as young as two years of age appear to have productive control over the det-A construction. For example, an inspection of the CHILDES database (MacWhinney & Snow, 1985; 1990) revealed spontaneous production of det-A phrases, such as “*un azul*” (a blue (one)) and “*un blanco*” (uno blanco) (a white (one)) at 2;8, and “*un un un un gran paece un lobo*” (a a a a big (one) it-seems-to-be a wolf) at 3;5 (taken from the transcript of Juan, cited in Snyder, 1995).

In English and French, det-A constructions are quite rare and are highly

deletion (Bello, 1973; Stockwell, Bowen, & Martin, 1965); others describe it as a pro-form or dummy nominal that is present only in the underlying structure (Hadlich, 1971; Otero, 1976). Still others maintain that in such constructions, a noun-stem is incorporated into the determiner itself (Bernstein, 1993).

<sup>7</sup> The diagnostic for this syntactic assignment hinges on privileges of occurrence. If the adjectives in det-A phrases were functioning syntactically as nouns, then they would be limited by the same restrictions as we see for nouns. This is not the case, as can be seen in the Spanish examples below (English glosses provided in parentheses). In Spanish, adjectives can be modified with directly antecedent adverbs (examples (7) and (8) below); nouns cannot be so modified (examples (9) and (10) below) (Kester, 1994; Snyder, 1995).

- (7) una roja (a red (one))  
una muy roja (a very red (one))
- (8) los cuidadosos (the careful (ones))  
los muy cuidadosos (the very careful (ones))
- (9) una mesa (a table)  
\*una enormemente mesa (\*an enormously table)
- (10) las girafas (the giraffes)  
\*las enormementes girafas (\*the enormously giraffes)

restricted in form, as can be seen in examples (1) through (6) above.<sup>8</sup> In English, the types of expressions found in (2) through (6) would require a noun or pronoun following the adjective to sound natural to a native English-speaker. French shares most of the restrictions against det-A forms found in English, as can be seen in (4) through (6). In these languages, permissible det-A constructions appear to be frozen forms, learned on a case-by-case basis rather than emerging as the product of a productive rule.

To summarize, det-A constructions are pervasive in Spanish, but in neither English nor French. In these constructions, adjectives appear in syntactic contexts that overlap with those permissible for count nouns. Although the adjectives in these expressions retain their syntactic assignment as adjectives, these constructions are permitted to adopt a semantic function that is canonical for nouns: det-A phrases typically refer to an object or class of objects.

We suspected that this difference in the use of adjectives in Spanish, as opposed to French and English, may have consequences in children's performance in the Novel Adjective control condition. Our specific predictions for the experiments reported here stem directly from our review of the developmental and cross-linguistic literatures. First, we predict that children's interpretive bias for novel count nouns will be evident across the languages examined here, just as it has been evident in infants and preschool-aged children acquiring English as their first language (cf., Balaban & Waxman, 1995; 1996; Waxman & Markow, 1995; Waxman & Hall, 1993). Second, we expect that children in a No Word control condition will evidence no such interpretive bias. Third, we ask whether and how the difference in grammatical use of adjectives in Spanish affects children's performance in a Novel Adjective control condition. We predict that in Spanish, where adjectives are permitted to adopt some the syntactic and semantic features associated with nouns, children may extend novel adjectives, like nouns, to superordinate level categories of objects. In contrast, in English and in French, where this interpretation of novel adjectives is not available, children should fail to extend novel adjectives to superordinate level categories of objects.

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<sup>8</sup> In English, det-A constructions can appear only with the definite article (the), only in singular form while taking plural verb agreement (as in, "the poor are hungry"), and they are restricted to a generic, usually human, interpretation. French permits the det-A form to appear with either definite or indefinite articles and with singular or plural morphology (see examples (1) through (3)). Nonetheless, in French, as in English, these forms are lexically restricted. Where they do appear, they have a strong human interpretation. For the present discussion, we are excluding det-A phrases that are interpretable with an elliptical context. Phrases with ellipses depend on a structurally similar phrase in the same sentence or in the sentence immediately preceding. Such sentences are often acceptable in English and French, and presumably involve some copying of the noun from the first noun phrase into the second noun phrase, for example: "I prefer the mild salsa but Rebecca prefers the hot." We also exclude here det-A expressions that become acceptable only when they have contrastive stress. In these cases, an understood subcategorization is being made with respect to the feature being discussed. For example, it is acceptable to say, of two differently-colored dresses, "I prefer the red."

TABLE 1

Experiment 1 (French): Complete List of Stimuli (and the Grammatical Gender Designation (m or f) Associated with the Corresponding Basic Level Label)

Target	Taxonomic responses		Thematic responses	
Gender-consistent trials				
bread <sup>m</sup>	corn <sup>m</sup>	cheese <sup>m</sup>	oven <sup>m</sup>	knife <sup>m</sup>
horse <sup>m</sup>	elephant <sup>m</sup>	pig <sup>m</sup>	jockey <sup>m</sup>	horseshoe <sup>m</sup>
bird <sup>m</sup>	squirrel <sup>m</sup>	owl <sup>m</sup>	tree <sup>m</sup>	nest <sup>m*</sup>
fish <sup>m</sup>	lobster <sup>m</sup>	bird <sup>m</sup>	aquarium <sup>m*</sup>	fish-hook <sup>m</sup>
dog <sup>m</sup>	bear <sup>m</sup>	zebra <sup>m</sup>	dog's bowl <sup>m</sup>	dog-bone <sup>m</sup>
squirrel <sup>m</sup>	cat <sup>m</sup>	fox <sup>m</sup>	acorn <sup>m</sup>	tree <sup>m</sup>
Gender-mixed trials				
flower <sup>f</sup>	plant <sup>f</sup>	tree <sup>m</sup>	bee <sup>f</sup>	vase <sup>m</sup>
cow <sup>f</sup>	giraffe <sup>f</sup>	dog <sup>m</sup>	barn <sup>f</sup>	milk <sup>m</sup>
rabbit <sup>m</sup>	pig <sup>m</sup>	rat <sup>f</sup>	Easter egg <sup>m</sup>	carrot <sup>f</sup>
bee <sup>f</sup>	chicken <sup>f</sup>	butterfly <sup>m</sup>	flower <sup>f</sup>	beehive <sup>m*</sup>
banana <sup>f</sup>	apple <sup>f</sup>	grapes <sup>m</sup>	girl <sup>f</sup>	monkey <sup>m</sup>
mouse <sup>f</sup>	frog <sup>f</sup>	rabbit <sup>m</sup>	mouse-trap <sup>f</sup>	cheese <sup>m</sup>

*Note.* Items marked with asterisks were produced in our laboratory. All others were selected from Snodgrass and Vanderwart (1980).

## EXPERIMENT 1

### Method

*Subjects.* Eighty-seven monolingual French-speaking children participated in the study, including 25 2-year-olds (mean age 2;8, ranging from 2;4 to 3;0), 31 3-year-olds (mean age 3;5, 3;1 to 4;0), and 31 4-year-olds (mean age 4;4, ranging from 4;0 to 5;0). All were enrolled in daycare centers serving racially-mixed, middle-class populations in the French-speaking section of Montreal, Canada. Approximately equal numbers of males and females were assigned to each condition.

For each child participating in the study, French was the language spoken in the home and in the daycare centers. We also encountered 13 bilingual children who were excluded to ensure that the French-speaking sample, like the English-speaking samples we have examined in previous work, was a monolingual one.

*Stimuli.* Stimuli were black-and-white line drawings; each was approximately four cm high. See Table 1 for a complete list of stimuli and their sources. 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 of these response stimuli belonged to the same superordinate level category as the target; the remaining two response stimuli were thematically related to the target. There were 12 such pages; each page constituted a trial. The position of the taxonomically related and thematically related items on each page was counterbalanced over trials.

As can be seen in Table 1, half of the trials were gender-consistent and half were gender-inconsistent. On gender-consistent trials, all objects depicted on a page had associated with them the same grammatical gender. On gender-inconsistent trials, one taxonomic and one thematic choice shared the same grammatical gender as the target; the remaining choices had associated with them a different grammatical gender.

TABLE 2  
Experiment 1 (French): Complete List of Novel Words

Novel nouns	Novel adjectives
fopin	fopée
dakam	dakée
seba	sebéé
bamue	bamée
bivok	bivée
miglin	miglée
keva	kevée
roga	rogée
tato	tatée
loba	lobée
mipaf	mipée
rabile	rabée

### Procedure

Children were tested individually, in a quiet undisturbed area on the daycare center premises. They were randomly assigned to a Novel Noun ( $n = 30$ ), Novel Adjective ( $n = 30$ ), or No Word ( $n = 27$ ) condition (described below).<sup>9</sup> The procedure lasted approximately 15 min and was conducted entirely in French; English translations may be found in parentheses.

The experimenter introduced children in all conditions to a hand puppet named Zupe. She explained that the puppet came from another planet and wanted to show the child some pictures, but could not speak French. She explained that the puppet had his own “special” words for things.

*No Word condition.* In this 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, “Vois-tu ça? Zupe (the puppet) m’a dit qu’il aime ça. Peux-tu m’en montrer un/une autre?” (“See this? Zupe told me that he likes this. Can you show me another one?”) Children were instructed to indicate their choices by pointing. After completing 12 trials, the experimenter (ex.) went through the book a second time to elicit second choices on each page. For example, she would say, “Souviens-tu que tantôt je t’ai montré ça (ex. points to target), et tu m’as dit que ça (ex. points to child’s previous choice) c’était un/une autre. Peux-tu m’en montrer un/une autre maintenant?” (“Remember when I showed you this (indicating the target item), and you told me that this (indicating the child’s first choice) is another one? Can you show me another one now?”)

*Novel Noun condition.* Instructions in this condition were identical to those in the No Word condition, with one exception: For each trial, as the experimenter pointed to the target item, she labeled it twice with a nonsense noun, using a different novel noun for each trial. (See Table 2

<sup>9</sup> The number of children at each age assigned to the *No Word*, *Novel Noun*, and *Novel Adjective* conditions were as follows:

	No word	Novel noun	Novel adjective
2-year-olds:	7	9	9
3-year-olds:	10	10	11
4-year-olds:	10	11	10

for a complete list of novel nouns used in this experiment.) For example, she would say, "Vois-tu ça? Zupe m'a dit qu'il appelle ça un/une *fopin/fopine*. Peux-tu me montrer un/une autre *fopin/fopine*?" ("See this? Zupe told me that this is called a *fopin*. Can you show me another *fopin*?") 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 say, "Souviens-tu que tantôt Zupe a dit que ça c'est un/une *fopin/fopine* (ex. points to target), et tu m'as dit que ça (ex. points to child's previous choice) c'était un/une autre *fopin/fopine*? Peux-tu me montrer un/une autre *fopin/fopine* maintenant?" ("Remember when Zupe said that this is a *fopin* and you told me that this is another *fopin*? Can you show me another *fopin* now?")

*Novel Adjective condition.* Instructions in this condition were identical to those in the Novel Noun condition, with one crucial exception: the novel labels were presented in an adjectival context. (See Table 2 for a complete list of novel adjectives used in this experiment.) All novel adjectives were constructed with the characteristic French adjectival suffix, *ée*. As in the Novel Noun condition, each adjective was mentioned twice per trial. For example, the experimenter pointed to the target and would say, "Vois-tu ça? Zupe m'a dit que c'est une chose qui est *fopée*. Peux-tu me montrer une autre chose *fopée*, une autre chose qui est *fopée*?" ("See this? Zupe told me that this is called a *fopish thing*." Can you show me another thing that is *fopish*?") 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 say, "Souviens-tu que tantôt Zupe a dit que ça c'est une chose *fopée* (ex. points to target), et tu m'as dit que ça (ex. points to child's previous choice) c'était une autre chose qui est *fopée*? Peux-tu me montrer une autre chose qui est *fopée* maintenant?" ("Remember when Zupe said that this is a *fopish thing* and you told me that this is another thing that is *fopish*? Can you show me another thing that is *fopish* now?")

We sought to satisfy two criteria in selecting syntactic frames for the novel words in each condition: (1) that the frames be as comparable as possible across the languages tested, and (2) that they provide clear evidence for the intended syntactic assignment of the novel word. Following Waxman and Kosowski, we introduced each novel word twice. Novel nouns were embedded in two different syntactic frames ("... un/une \_; ... un/une autre \_"); this presentation is comparable to the English instructions in Waxman and Kosowski and provides unambiguous evidence that the novel word is a count noun. Novel adjectives were embedded in two different syntactic frames, once modifying the noun or pronoun in the main clause ("... une chose \_"), and once as part of a relative clause ("... une autre chose qui est \_"); this presentation is comparable to the English instructions in Waxman and Kosowski and together, these two frames provide unambiguous evidence that the novel word is an adjective. (For the purpose of comparison, it is interesting to note that in English, the first frame ("... a(n) \_ one") is clearly adjectival, but the latter frame ("... another one that is \_") is permissible for adjectives or mass nouns.) English-speaking preschool-aged children clearly distinguish novel nouns from adjectives on the basis of syntactic frames like these (Waxman, 1990, 1995; Waxman & Kosowski, 1990).

*Scoring.* Children's first and second choices were recorded for each page (trial). For a first choice, the probability of choosing taxonomically (or thematically) 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 taxonomic (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 taxonomic and one thematic choice is .33 (.50 for the first choice  $\times$  .67 for the second choice).

### *Results and Discussion*

The results of this experiment provide empirical support for the prediction that the specific linkage between count nouns and categories of objects is not a phenomenon that is evident only in English. The data from the French-speaking children are comparable in all respects to the data obtained pre-

TABLE 3

Experiments 1–3: Mean Proportion of Trials (and SD's) on Which Subjects in Each Condition Selected the Taxonomic Alternatives (a) on Both First and Second Choices Consistently (% tax–tax) and (b) on First Choice Alone (% tax–1st)

	Novel noun		Novel adjective		No word	
	% tax–tax	% tax–1st	% tax–tax	% tax–1st	% tax–tax	% tax–1st
Expected	.17	.50	.17	.50	.17	.50
Expt 1	.36**	.66**	.23	.51	.20	.51
French	(.24)	(.26)	(.19)	.22	(.15)	.22
Expt 2	.70**	.87**	.37**	.57	.20	.50
Spanish	(.22)	(.11)	(.27)	(.26)	(.17)	(.20)
Expt 3a	.68**	.70*	.64**	.78*	.25	.44
Spanish	(.35)	(.34)	(.33)	(.24)	(.25)	(.32)
Expt 3b	.53*	.67	.21	.30	.26	.39
English	(.37)	(.30)	(.31)	(.31)	(.33)	(.38)

Note. Asterisks refer to *t* tests against the expected (chance) level of responding.

\*  $p < .05$ .

\*\*  $p < .005$ .

viously with English-speaking samples (Waxman & Kosowski, 1990). The overall response patterns for children in the Novel Noun, Novel Adjective, and No Word conditions are depicted in Table 3.

In our first analysis, we compared the proportion of trials in which children selected the taxonomically related items consistently on both their first and second trials. See Fig. 1. A Condition (3)  $\times$  Age (3) between subjects ANOVA conducted on this dependent variable revealed a main effect for Condition,  $F(2,78) = 5.10$ ,  $p < .01$ , depicted in Fig. 1. Children in the Novel Noun condition selected both category members ( $M = .36$ ) more often than did their age-mates in either the Novel Adjective ( $M = .23$ ) or the No Word ( $M = .20$ ), Fisher PLSD, both  $p$ 's  $< .05$ . There was no difference between performance in the Novel Adjective and No Word conditions. Further, children in the Novel Noun condition selected both category members more often than would be expected by chance (recall that chance is .17),  $t(29) = 4.26$ ,  $p < .001$ ; those in the Novel Adjective and No Word conditions did not differ from chance, both  $p$ 's  $> .10$ . The finding that performance in the No Word condition is indistinguishable from chance is also noteworthy. It reveals that in a neutral, no word context, French-speaking children reveal neither a consistent taxonomic nor thematic preference. This is comparable to data from their English-speaking counterparts.

The preceding analysis, which represents the rate of *consistently* taxonomic responding over both first and second trials (% tax–tax), provides a strong test because it permits us to ascertain when children are selecting *all and only* the taxonomically-related alternatives. However, we also include a secondary

analysis, using children's first responses alone as the dependent measure, because it provides a point of comparison with previous studies with English-speaking children which required only a single choice for each target item (cf., Bauer & Mandler, 1992; Markman & Hutchinson, 1984; Waxman & Hall, 1993). A Condition (3)  $\times$  Age (3) ANOVA based on children's first responses alone revealed a main effect for Condition,  $F(2,78) = 4.23, p < .02$ . Children in the Novel Noun condition selected more category members ( $M = .66$ ) than did their age-mates in either the Novel Adjective ( $M = .51$ ) or No Word condition ( $M = .51$ ), Fisher PLSD, both  $p$ 's  $< .05$ . Moreover, children in the Novel Noun condition selected category members more often than would be expected by chance,  $t(29) = 3.29, p < .005$ ; those in the Novel Adjective and No Word conditions did not. The ANOVA also revealed a main effect for Age,  $F(2,78) = 4.23, p < .02$ . Averaged across conditions, 3-year-olds ( $M = .63$ ) were more likely than 4-year-olds ( $M = .47$ ) to select taxonomically-related items as first choices, Fisher PLSD,  $p < .05$ . The 2-year-olds ( $M = .57$ ) did not differ from either 3- or 4-year-olds. There was no interaction between Age and Condition.

Another analysis, in which items were treated as a random factor, offered converging support for the hypothesis that French-speaking children appreciate a specific linkage between novel nouns and categories of objects. When target items were labeled with novel nouns, they evoked significantly more consistently taxonomic responses on both trials ( $M = .34$ ) than when those items were labeled with novel adjectives ( $M = .21$ ) or when they received no label ( $M = .19$ ),  $F(2,35) = 17.85, p < .0001$ . This suggests that the effects

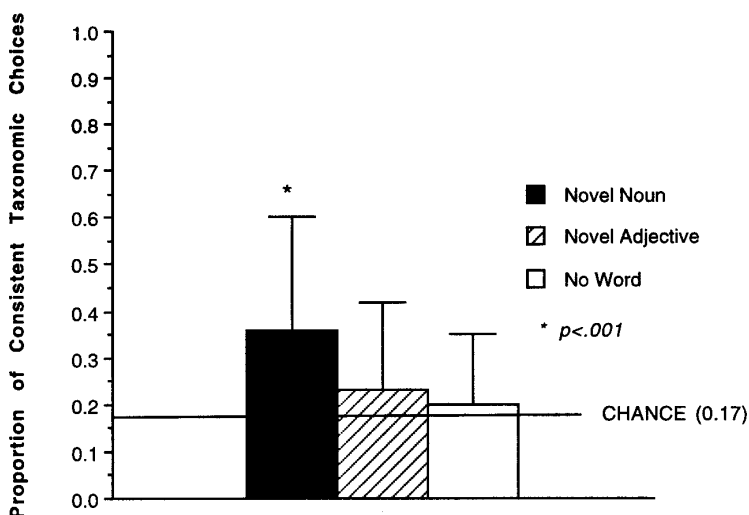


FIG. 1. Experiment 1 (French). Mean proportion of consistently taxonomic selections (tax-tax) as a function of Condition.

observed with this particular set of stimuli are generalizable to other materials as well (Clark, 1973).

These results suggest that in French, as in English, novel nouns (but not novel adjectives) highlight taxonomic relations among category members at the superordinate level. However, two alternative hypotheses are also consistent with this finding. First, we considered the possibility that the novel nouns exert a less precise effect than the one we have proposed. Perhaps, for example, novel nouns inspire children to choose *consistently* across trials. If this is the case, then children in the Novel Noun condition should also exhibit a high proportion of consistently *thematic* responses. To test this hypothesis, we conducted a separate analysis, using the proportion of trials on which children made consistently thematic responses as a dependent measure. There were no differences in the proportion of consistently thematic responses among the three conditions. Moreover, the proportion of consistently thematic responding in each condition was indistinguishable from chance. This finding, which parallels Waxman and Kosowski's (1990) results with the English-speaking children, supports the prediction that in French, novel nouns, but not adjectives, focus attention specifically on superordinate level categories of objects.

We also considered a second alternative interpretation: Perhaps children "translated" the novel nouns into familiar superordinate level category terms (e.g., "animal"), and novel adjectives into familiar attributes or descriptive phrases (e.g., "furry thing" or "brown one"), and then used their translations to guide their item selections. In other words, performance in the experiment proper may be attributable to children's translations to particular known words rather than to an abstract bias linking nouns to object categories.

To explore this possibility, we conducted a control study to elicit children's translations of the novel words presented in the experiment proper. Eighteen monolingual French-speaking children, none of whom had participated in the experiment proper, served as subjects. Two children at each age (2, 3, and 4 years of age) were assigned randomly to either the Novel Noun, Novel Adjective, or No Word condition. In the Novel Noun condition, the experimenter pointed to the target item and said, for example, "See this? Zupe calls this a \_." What do you think \_ means?" In the Novel Adjective condition, she said, "See this? Zupe calls this a \_ one." What do you think \_ means?" In this No Word control condition, the experimenter simply pointed to each target and simply asked, "See this? What do we call this?"

The results of the control study were straightforward. Children in all conditions offered exclusively basic level nouns in response to the experimenter's queries. Across conditions, children offered basic level names on 95% of all trials. On the remaining 5% of trials, children indicated that they could not provide a label for the object. Thus, the only labels supplied were basic level terms; neither superordinate level terms nor adjectives were offered on a single occasion. This finding, which is consistent with that obtained with English-speaking children (Markman & Hutchinson, 1984; Waxman & Ko-



sowski, 1990), serves as direct evidence against the "translation hypothesis." If children in the experiment proper had based their selections on direct translations of the novel words, then performance in all three conditions would have been indistinguishable. This was definitely not the case. On the contrary, children in the Novel Noun condition performed very differently than did children in the Novel Adjective and No Word conditions. It is therefore unlikely that the pattern of performance we obtained in the experiment proper could have been mediated by children translating the novel words directly into familiar French labels.

Finally, we conducted a supplementary series of analyses to examine the possibility that the French-speaking children were influenced in their choices by the grammatical gender associated with the objects depicted in our experiment. There was no evidence that this was the case.<sup>10</sup> This is consistent with the argument that children treat grammatical gender as arbitrary with respect to meaning (Berman, 1985; E. Clark, 1985; Karmiloff-Smith, 1979; Levy, 1983; Perez-Pereira, 1991).

In sum, the data from the French-speaking children echo those of the English-speaking children: Novel nouns focused the French-speaking children's attention on superordinate level category members; novel adjectives clearly did not have this effect. Preschool-aged children learning either English or French are sensitive to the syntactic environment in which a novel word is presented. Moreover, the effect of introducing novel nouns is forceful enough to guide children in both their first and second sets of choices, even in the presence of clear thematic alternatives and gender-matches.

## EXPERIMENT 2

In this experiment we ask whether preschool-aged children acquiring Spanish as their first language also reveal a specific expectation that a count noun applied to an individual object refers to that object and other members of the same superordinate level object category. Using a method that parallels that

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<sup>10</sup> As in the main analyses, we examined two different dependent measures: (a) the proportion of trials on which subjects selected both category responses (taxonomic-taxonomic) and (b) the proportion of trials on which subjects selected a category response on the first trial. We first compared performance on the gender-mixed vs gender-consistent trials within each condition. We conducted a series of ANOVA's in which Age served as a between-subjects factor and Trial-type (gender-consistent vs gender-mixed) served as a within-subjects factor. These analyses revealed no differences between performance on gender-consistent vs gender-mixed trials, suggesting that children's choices were not influenced by the grammatical gender associated with the depicted objects. We next focused exclusively on the gender-mixed trials to ascertain the extent to which grammatical gender influences performance in each condition. We conducted Age  $\times$  Grammatical Gender (same gender vs different gender) ANOVA's to determine whether children were more likely to pick objects that shared grammatical gender designation with the target than those assigned a different grammatical gender. These analyses revealed that children's choices were not influenced by the grammatical gender associated with the various depicted objects. In every condition, children chose the same-gender objects and the different-gender objects with equal frequency.

TABLE 4

Experiments 2 and 3 (Spanish): Complete List of Stimuli (and the Grammatical Gender Designation (m or f) of the Associated Basic Level Label

Target	Taxonomic responses		Thematic responses	
Gender-consistent trials				
dog <sup>m</sup>	bear <sup>m</sup>	fox <sup>m</sup>	bone <sup>m</sup>	bowl <sup>m</sup>
carrot <sup>f</sup>	apple <sup>f</sup>	pear <sup>f</sup>	pot <sup>f</sup>	stove <sup>f</sup>
bird <sup>m</sup>	rabbit <sup>m</sup>	swan <sup>m</sup>	nest <sup>m*</sup>	tree <sup>m</sup>
horse <sup>m</sup>	elephant <sup>m</sup>	pig <sup>m</sup>	jockey <sup>m</sup>	barn <sup>m</sup>
flower <sup>f</sup>	plant <sup>f</sup>	leaf <sup>f</sup>	bee <sup>f</sup>	watering can <sup>f</sup>
Gender-mixed trials				
rat <sup>f</sup>	squirrel <sup>f</sup>	duck <sup>m</sup>	cheese <sup>f</sup>	cage <sup>m</sup>
banana <sup>f</sup>	apple <sup>f</sup>	lemon <sup>m</sup>	girl <sup>f</sup>	monkey <sup>m</sup>
car <sup>m</sup>	bus <sup>m</sup>	bicycle <sup>f</sup>	key <sup>f</sup>	stoplight <sup>m</sup>
jacket <sup>f</sup>	skirt <sup>f</sup>	dress <sup>m</sup>	suitcase <sup>f</sup>	hanger <sup>m</sup>
rabbit <sup>m</sup>	donkey <sup>m</sup>	sheep <sup>f</sup>	Easter egg <sup>m*</sup>	carrot <sup>f</sup>
cake <sup>f</sup>	ice cream cone <sup>m</sup>		strawberry <sup>f</sup>	stove <sup>f</sup> knife <sup>m</sup>

*Note.* Items marked with asterisks were produced in our laboratory. All others were selected from Snodgrass and Vanderwart (1980).

of Experiment 1, we compare performance in a Novel Noun, Novel Adjective, and No Word condition.

## Method

### *Subjects*

Forty-five monolingual Spanish-speaking preschool children participated in this study. All were enrolled in private schools serving a middle-class population in Buenos Aires, Argentina. Subjects had a mean age of 4;1, ranging from 3;1 to 4;9. Approximately equal numbers of boys and girls were assigned to each condition.

### *Stimuli*

Stimuli were black and white line drawings, comparable to those employed in Experiment 1. A complete set of stimuli can be found in Table 4. This experiment included 11 trials; six trials were gender-consistent; five trials were gender-mixed. This design feature is described thoroughly in Experiment 1.

### *Procedure*

Children were tested individually, in a quiet undisturbed area of their classrooms. They were randomly assigned to a No Word ( $n = 15$ ), Novel Noun ( $n = 15$ ), or Novel Adjective ( $n = 15$ ) condition (described below). The procedure lasted approximately 15 min and was conducted entirely in Spanish; English translations of these instructions may be found in parentheses.

The experimenter introduced children in all conditions to a hand puppet named Tiki. She explained that the puppet came from another planet and wanted to show the child some pictures, but could not speak Spanish. She explained that the puppet had his own "special" words for

TABLE 5  
Experiments 2 and 3 (Spanish): Complete List of Novel Words

Novel nouns	Novel adjectives
fopine	foposa
dacope	dacosa
sebate	sebosa
charule	charosa
bivoque	bivosa
miguine	migosa
quelepe	quelosa
romade	romosa
tatene	tatosa
lusene	lusosa
gipafe	giposa

things. Each of the conditions (described below) varied in the type of linguistic information used to introduce each target object.

*No Word condition.* As in Experiment 1, in this 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 (e.g., a bird) and said, “Mirá ésta cosa. ¿Me mostrás otra?” (“See this thing? Can you show me another?”). Children were instructed to indicate their choices by pointing.

After completing 11 trials, the experimenter went through the book a second time to elicit second choices on each page. For example, she would say, “¿Te acordás cuando te mostré esta cosa y vos me dijiste que ésta era otra? ¿Me mostrás otra más?” (“Remember when I showed you this thing (target), and you told me that this (child’s choice) was another one? Can you show me yet another?”).

*Novel Noun condition.* The instructions in this condition were identical to those in the *No Word* condition, with one exception: For each trial, as the experimenter pointed to the target item, she labeled it twice with a nonsense noun, using a different novel noun for each trial. (See Table 5 for a complete list of novel words used in this experiment.) For example, she said, “Mirá una/un *fopine*. ¿Me mostrás otro/a *fopine*?” (“Look, a *fopine*. Can you show me another *fopine*?”) All novel nouns had gender neutral endings. The gender of the article agreed with the gender associated with the familiar basic level Spanish label for the target.

After completing all 11 trials, the experimenter went through the book a second time to elicit second choices on each page. For example, she said, “¿Te acordás cuando te mostré este/a *fopine* y vos me dijiste que éste/a era otro/otra? ¿Me mostrás otro/a *fopine* más?” (Remember when I showed you this *fopine* (target), and you told me that this (child’s choice) was another? Can you show me yet another *fopine*?”).

*Novel Adjective condition.* In this condition, the novel labels were presented in an adjectival context. As in the *Novel Noun* condition, each adjective was mentioned twice per trial. For example, the experimenter pointed to the target, saying, “Mirá una cosa *foposa*. ¿Me mostrás otra que sea *foposa*?” (“Look, a *foposa* thing. Can you show me another that is *foposa*?”).

To elicit the second choices, the experimenter said, for example, “¿Te acordás cuando te mostré esta cosa *foposa* y vos me dijiste que ésta era otra? ¿Me mostrás otra que sea *foposa* más?” (“Remember when I showed you this *foposa* thing (target), and you told me that this (child’s choice) was another? Can you show me yet another that is *foposa*?”).

As in Experiment 1, and in previous studies involving English-speaking children (Waxman & Kosowski, 1990), we mentioned each novel word twice in our introductory instructions, embedding the novel nouns in the two different syntactic frames (“. . . un/una \_; . . . otro/a \_”) and the novel adjectives in two different syntactic frames, once in the main clause (“. . . una

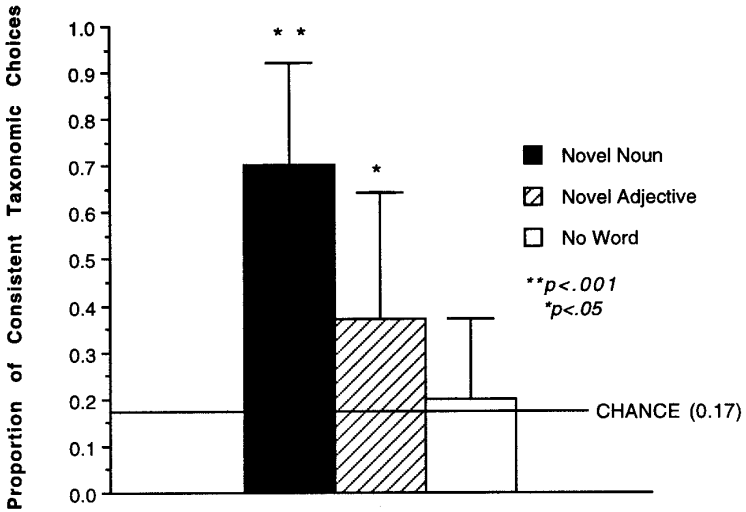


FIG. 2. Experiment 2 (Spanish). Mean proportion of consistently taxonomic selections (tax-tax) as a function of Condition.

cosa \_'''); and once as part of a relative clause ('. . . otra que sea \_'''). The use of an overt familiar noun (cosa) in this condition parallels precisely the instructions used in French and renders the syntactic assignment of the novel word as unambiguously adjectival.

### Scoring

This was identical to Experiment 1.

## Results and Discussion

The results of this experiment reveal important commonalities, as well as systematic differences, between young children acquiring Spanish and those acquiring French or English as their first language. Like their English- and French-speaking counterparts, Spanish-speaking preschoolers in the Novel Noun condition exhibited a strong preference to select those items that are taxonomically related to the target. The Spanish-speaking children in the No Word condition also performed comparably to their counterparts acquiring other languages, exhibiting no systematic preference for the taxonomic, thematic, or gender-related choices. However, when presented with novel adjectives, the Spanish-speaking children revealed a pattern that diverged from that of their English- and French-speaking counterparts: they displayed a distinct inclination to select the taxonomically related items. The overall response patterns for each condition appears in Table 3.

As in Experiment 1, we first compared the proportion of trials for which children in each condition selected members of the superordinate level consistently on both their first and second trials. A Condition (3)  $\times$  Age (2) between-subjects ANOVA revealed a main effect for Condition,  $F(2,39) = 18.96$ ,  $p < .0001$ , depicted in Fig. 2. Post-hoc analysis of the effect revealed significant

differences among all three conditions, Fisher PLSD, all  $p$ 's  $< .05$ . Children in the Novel Noun condition selected taxonomic alternatives consistently on both trials ( $M = .70$ ) more frequently than did children in either the Novel Adjective ( $M = .37$ ) or the No Word conditions ( $M = .20$ ). The difference between performance in the Novel Adjective and No Word conditions was also significant. A main effect for Age,  $F(1,39) = 4.76$ ,  $p < .05$ , indicated that 4-year-olds ( $M = .50$ ) were more likely than 3-year-olds ( $M = .34$ ) to consistently select the taxonomic alternatives. There were no other main effects or interactions.

We next compared performance in each condition to the level expected by chance. As was the case in Experiment 1, children in the Novel Noun condition selected both category members more often than would be expected by chance  $t(14) = 9.25$ ,  $p < .0001$ ; those in the Novel Adjective condition also chose both category members at a rate that exceeded chance,  $t(14) = 2.89$ ,  $p = .01$ ; those in the No Word condition consistently responded at the chance level, demonstrating no particular preference for either the thematic or taxonomic alternatives.

The finding that performance in the No Word condition is indistinguishable from chance is particularly important in this experiment because it reveals that the pictorial stimuli themselves were neutral with respect to the task: children in this control condition exhibited neither a taxonomic nor thematic preference. This insures that the Spanish-speaking children's tendency to select the taxonomic alternatives in the Novel Adjective conditions is not a consequence of the taxonomic alternatives being more salient or more attractive choices for the children.

As in Experiment 1, we also conducted a secondary Condition (3)  $\times$  Age (2) between-subjects ANOVA based on children's first responses alone. This analysis revealed a main effect for Condition,  $F(2,39) = 12.81$ ,  $p < .0001$ . Post-hoc analyses revealed that performance in the Novel Noun condition ( $M = .87$ ) differed from that in the No Word ( $M = .50$ ) and the Novel Adjective ( $M = .57$ ) conditions, Fisher PLSD, both  $p$ 's  $< .05$ ; performance in the latter two conditions did not differ reliably. Further, performance in the No Word and Novel Adjective conditions did not differ from chance; only in the Novel Noun condition did the rate of taxonomic responding exceed the rate expected by chance,  $t(14) = 12.54$ ,  $p = .0001$ .

An analysis based on items as a random factor upheld the effect of Condition that was revealed in the primary analysis,  $F(10,32) = 63.87$ ,  $p = .0001$ . When target items were labeled with novel nouns, they evoked significantly more consistently taxonomic responses on both trials ( $M = .70$ ) than when those items were labeled with novel adjectives ( $M = .37$ ); in addition, both novel nouns as well as novel adjectives elicited more taxonomic responses than did unlabeled items ( $M = .20$ ), Fisher PLSD, all  $p$ 's  $< .05$ .

Another series of analyses, parallel to those reported in Experiment 1, was conducted to examine any potential effects of grammatical gender on children's item selection. As with the French-speaking children, there was no

evidence whatsoever that performance was influenced by the grammatical gender of the depicted objects.

These results reveal in Spanish-speaking children a distinct inclination to extend a novel adjective, applied to an individual object, to other members of the same superordinate level category. To examine the generalizability of this phenomenon, we also conducted an independent experiment, in which we varied in two ways the context in which the novel adjectives were introduced. First, we introduced the novel adjectives within det-A constructions (as opposed to the determiner–adjective–noun phrases included in Experiment 2 proper). Second, because there is little published work regarding the acquisition of adjectival suffixes in Spanish, we also examined the influence of two additional characteristic adjectival suffixes, by appending either *-ado* or *-ante* to each novel adjective (as opposed to the *-oso* suffix included in Experiment 2 proper).

These modifications had virtually no impact on Spanish-speaking preschool-aged children's tendency to consistently choose the taxonomically-related items in the Novel Adjective conditions.<sup>11</sup> The taxonomic inclination was evident (1) when the novel adjectives were presented within different syntactic constructions (cf., within det-A phrases as well as within phrases incorporating an overt noun (*cosa*)), and (2) when the novel adjectives were appended with various adjectival suffixes. In each of the adjectival contexts that we have examined, the tendency to select taxonomic alternatives was significantly more pronounced in the Novel Noun than the Novel Adjective conditions. Nonetheless, the taxonomic inclination held up reliably across these various adjectival contexts. This result is important because it suggests that children's expectations concerning the extension of novel words presented as nouns is comparable across the languages tested here, but that there is cross-linguistic variation in their expectations concerning the extension of novel words presented as adjectives.

This difference in the Spanish-speaking children's interpretation of novel words presented as adjectives is intriguing. It cannot be attributed to proce-

<sup>11</sup> In this additional experiment, children were randomly assigned to a Novel Noun ( $n = 17$ ), Novel Adjective (ado) ( $n = 15$ ), Novel Adjective (ante) ( $n = 14$ ), or No Word ( $n = 16$ ) condition. We compared the proportion of trials for which children in each condition consistently selected members of the superordinate level on both their first and second trials. An ANOVA based on this dependent measure revealed a main effect for Condition,  $F(3,54) = 8.26$ ,  $p < .0001$ . Performance in the two Novel Adjective conditions did not differ. However, performance in all other conditions did differ reliably from one another, Fisher PLSD, all  $p$ 's  $< .05$ . Children in the Novel Noun condition ( $M = .64$ ) selected both members of the same superordinate level category more often than chance,  $t(16) = 7.48$ ,  $p < .0001$ , and more often than did their agemates in the Novel Adjective (ado) ( $M = .45$ ) and Novel Adjective (ante) ( $M = .44$ ) conditions. Children in the Novel Adjective conditions also made consistent taxonomic selections more often than chance; Novel Adjective (ado/ada),  $t(14) = 4.88$ ,  $p = .0002$ ; Novel Adjective (ante),  $t(13) = 3.49$ ;  $p = .004$ , and more often than children in the No Word condition, Fisher PLSD, both  $p$ 's  $< .05$ . Children in the No Word condition responded at the chance level.

dural differences in the protocol of the experiment itself, for the procedure employed here were virtually identical to those employed with the French- and English-speaking children. Further, this difference does not appear to be a consequence of the particular drawings presented to the Argentine children for, as we pointed out, children in the No Word condition favored neither the taxonomic nor the thematic alternatives. But does the Spanish-speaking children's performance constitute evidence of a bona fide cross-linguistic difference in the expectations concerning the grammatical category *adjective* in Spanish, as opposed to English and French? Before considering this possibility, two alternative explanations warrant close consideration.

The first alternative concerns the possible effects of the stimulus materials. It is possible that Spanish-speaking children share with their age-mates acquiring French and English a specific expectation that novel adjectives will refer to object properties (as opposed to object categories), but that there were salient object properties (e.g., animacy, size, shape, texture) that happened to occur systematically in the taxonomic, rather than the thematic, alternatives in our task. Our inspection of the materials presented to the Argentine children did not suggest any such property interpretations. Nonetheless, because adult intuitions cannot take the place of children's judgments, we examined this alternative directly in a control experiment, presenting the visual materials used with the Argentine children to a group of English-speaking preschool-aged children.

The procedure for this control study was identical to that of Experiment 2, with one exception: the protocol was conducted entirely in English. Twenty-six preschool-aged children (mean age = 3;8, ranging from 3;3 to 4;10) participated. All subjects were enrolled in preschool programs serving racially mixed, middle-, to upper-middle-class populations in Cambridge, MA. Subjects were randomly assigned to either a Novel Noun, Novel Adjective, or No Word condition.

The results of the control experiment were entirely consistent with the results obtained previously with both English- and French-speaking children. English-speaking children in the Novel Adjective ( $M = .28$ ;  $SD = .10$ ) and No Word ( $M = .25$ ;  $SD = .14$ ) conditions evidenced no inclination toward the taxonomically-related items. Only children in the Novel Noun condition ( $M = .52$ ;  $SD = .24$ ) exhibited a preference for selecting the taxonomically-related objects. Like children in the No Word condition, those in the Novel Adjective condition performed at chance levels. This rules out the possibility that the effects obtained with the Argentine preschool children were a consequence of some artifact in the visual materials presented to that population. Therefore, the explanation for the Spanish-speaking children's tendency to select the taxonomically-related alternatives must rest with the introduction of the novel adjectives themselves. (See General Discussion for a consideration of possible mechanisms underlying this phenomenon.)

Another possible account of this phenomenon has a more explicitly developmental component. It is possible that mature speakers of Spanish, French,

and English hold the same semantic expectations for the grammatical category *adjective*, but that this expectation develops over a more protracted period in Spanish than in either French or English. This is plausible because in Spanish, the syntactic and semantic overlap between count nouns and adjectives (cf., in det-A constructions) may make the task of identifying the adjectives and discerning them from the nouns a more difficult process for learners of Spanish than learners of French or English.

We test this alternative in Experiment 3 by asking whether the tendency for Spanish speakers to extend novel adjectives to object categories undergoes developmental change as a function of age and language experience. In Experiments 3a and 3b, we examine the performance of 6- and 7-year-old Spanish- and English-speaking children, respectively. We selected this age group because it is the upper limit of the range for which the current procedure is sensitive. If the tendency to consistently select taxonomically in the Novel Adjective condition diminishes in the more mature Spanish-speakers, this will suggest that the ability to discern nouns from adjectives (*vis à vis* taxonomic relations) may emerge more gradually in Spanish than in either French or English. However, if the school-aged Spanish-speakers continue to extend novel adjectives taxonomically, or if this pattern becomes stronger with age, this will suggest that performance in the Novel Adjective condition reflects children's sensitivity to a bona fide difference in the extension of novel adjectives across languages.

## EXPERIMENT 3A

### *Method*

*Subjects.* Forty-five monolingual Spanish-speaking children participated. They had a mean age of 6;8, ranging from 6;2 to 7;3. All were enrolled in private schools serving a middle-class population in Buenos Aires, Argentina. Approximately equal numbers of boys and girls were assigned to each condition.

*Stimuli.* The stimuli were identical to those employed in Experiment 2.

*Procedure.* Children were randomly assigned to either the No Word, Novel Noun, or Novel Adjective condition. The procedure and instructions in each condition were identical to that employed in Experiment 2, with one minor exception. To accommodate the fact that these children were older than those in previous experiments, the experimenter dispensed with the puppet and explained instead that there was once an ancient tribe of people who spoke an ancient language. She then went on to administer the task, using the same instructions as in Experiment 2.

*Scoring.* This was identical to Experiment 1.

### *Results and Discussion*

As is evident in Table 3, the data from these 6- and 7-year-old Spanish-speaking children reveal no decrease in the tendency to extend novel adjectives to other members of the same superordinate level category. For 6- and 7-year-olds, as for preschoolers, novel words presented as either nouns or adjectives seem to be extended to include other members of superordinate level categories.

We first compared the proportion of trials in which children in each condi-



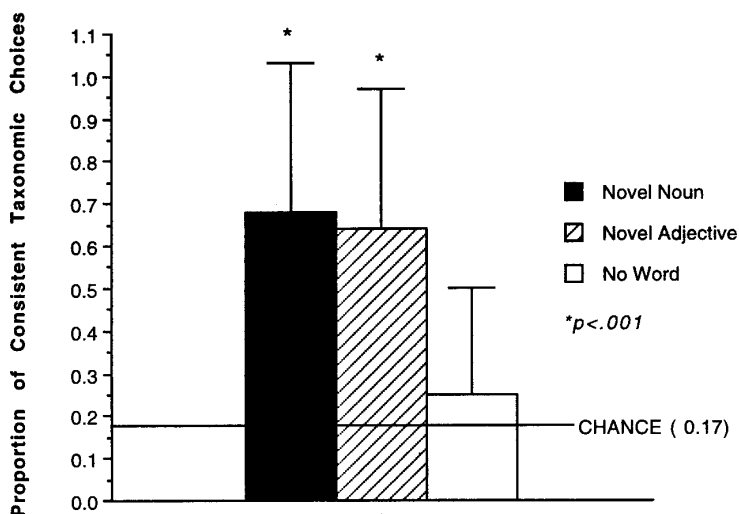


FIG. 3. Experiment 3a (Spanish). Mean proportion of consistently taxonomic selections (tax-tax) as a function of Condition.

tion selected the taxonomically related items consistently on both their first and second trials. A one-way ANOVA based on this dependent measure revealed a main effect for Condition,  $F(2,42) = 8.76$ ,  $p < .001$ , as depicted in Fig. 3. Children in both the Novel Noun ( $M = .68$ ) and the Novel Adjective ( $M = .64$ ) conditions were more likely to select both category members than were their age-mates in the No Word ( $M = .25$ ), Fisher PLSD, both  $p$ 's  $< .05$ . There was no difference between performance in the Novel Noun and Novel Adjective conditions.

Comparisons to chance revealed a similar pattern, with children in the Novel Noun and Novel Adjective conditions selecting both category members more often than would be expected by chance: Novel Noun,  $t(14) = 5.64$ ,  $p < .001$ ; Novel Adjective,  $t(14) = 5.54$ ,  $p < .001$ . Only children in the No Word conditions did not differ from chance.<sup>12</sup>

A one-way ANOVA based on children's first responses alone also revealed a main effect for Condition,  $F(2,42) = 5.14$ ,  $p = .01$ . Children in the Novel Noun ( $M = .70$ ) and Novel Adjective ( $M = .78$ ) conditions selected more category members on their first round of responding than did their age-mates

<sup>12</sup> There is one other difference between the patterns observed in these older children as compared to the preschool-aged children in the previous experiments. The 6- and 7-year-old Spanish-speaking children also exhibit a strong thematic preference in the No Word conditions, whereas the younger children in this condition were at chance. This is interesting because it makes the pattern observed in the Novel Noun and Novel Adjective conditions all the more striking. Spanish-speaking school-aged children actually switch their preference from thematic to taxonomic in the context of hearing a novel word, be it a noun or an adjective.

in the No Word condition ( $M = .44$ ). Moreover, children in the Novel Noun and Novel Adjective conditions selected category members more often than would be expected by chance: Novel Noun,  $t(14) = 2.23$ ,  $p < .05$ ; Novel Adjective,  $t(14) = 4.81$ ,  $p < .001$ ; those in the No Word condition did not.

An examination of Table 3 and Figs. 2 and 3 suggests that the tendency to choose the taxonomic alternatives in the Novel Adjective condition may be even more pronounced in the older than in the younger sample. To test this hypothesis, we compared directly the preschool-aged (Experiment 2) vs school-aged (Experiment 3a) children in each condition. Children in these experiments were presented with identical visual materials and were tested by the same experimenter. There were no reliable differences between these two age groups in either the Novel Noun ( $t(28) = -0.11$ ,  $p > .05$ ) or the No Word ( $t(28) = -0.64$ ,  $p > .05$ ) conditions, using the rate of consistently taxonomic performance as the dependent measure. However, the difference in the Novel Adjective condition was reliable,  $t(28) = 2.42$ ,  $p = .02$ , indicating that the tendency to extend novel adjectives taxonomically becomes stronger over developmental time. This suggests that there is a bona fide cross-linguistic difference in the interpretation of novel adjectives, and that this difference becomes more entrained with age.

For the purpose of comparison, we also examined the performance of a group of 6- and 7-year-old English-speaking children.

## EXPERIMENT 3B

### *Method*

*Subjects.* Thirty monolingual English-speaking children participated in this study. They had a mean age of 6;6, ranging from 5;2 to 7;10, and were drawn from a middle-class population in Evanston, IL. Approximately equal numbers of boys and girls were assigned to each condition.

*Stimuli.* The stimuli were identical to those employed in the original Waxman and Kosowski (1990) task designed for English-speaking children. See Table 6 for a complete list of stimuli.

*Procedure.* Children were randomly assigned to the No Word, Novel Noun, or Novel Adjective condition (see Table 7 for a complete list of novel words). The procedure and instructions in each condition were identical to those employed in Experiment 3a, except that the instructions were presented in English (as in Waxman and Kosowski, 1990).

*Scoring.* This was identical to Experiment 1.

### *Results and Discussion*

As can be seen in Table 3, the data from these older English-speaking children are wholly comparable to those obtained with the preschool-aged English speakers reported in Waxman and Kosowski (1990).

We first compared the proportion of trials in which children in each condition selected the taxonomically related items consistently on both their first and second trials. See Fig. 4. A contrast analysis revealed that children in the Novel Noun condition ( $M = .53$ ) were more likely to select both taxonomic alternatives than were children in the Novel Adjective ( $M = .21$ ) and No Word ( $M = .26$ ) conditions,  $F(1, 27) = 5.32$ ,  $p < .05$ . Only children in the Novel Noun condition consistently chose both taxonomic alternatives at a

TABLE 6  
Experiment 3b (English): Complete List of Stimuli

Target	Taxonomic responses		Thematic responses	
squirrel	cat	mouse	acorn*	tree
fish	bird	frog	fishtank*	fishing rod*
bread	corn	ice cream	knife	toaster
banana	grapes	apple	boy	monkey
horse	giraffe	elephant	saddle	jockey*
rabbit	skunk	pig	carrot	easter egg*
bird	butterfly	mouse	tree	nest*
dog	deer	bear	bone	dog house*
flower	tree	houseplant*	vase	bee
mouse	raccoon	fish	cheese	mousetrap
bee	owl	butterfly	beehive*	flower
cow	zebra	fox	milk	barn

*Note.* Items marked with asterisks were produced in this laboratory. All others were selected from Snodgrass and Vanderwart (1980).

TABLE 7  
Experiment 3b (English): Complete List of Novel Words

Novel nouns	Novel adjectives
fopin	fopish
dacop	dakish
sebah	sebish
chamu	chamish
bivok	bivish
miglin	migliish
kelap	kelish
omad	romish
tatsen	tatish
loobark	loobish
mipaft	mipish

rate that exceeded chance,  $t(9) = 3.11$ ,  $p = .013$ . There was no difference between performance in the Novel Adjective and No Word conditions; performance in these latter two conditions did not differ from chance.

A contrast analysis based on children's first responses alone revealed the same pattern: Children in the Novel Noun condition ( $M = .67$ ) selected more category members on their first round of responding than did their age-mates in the Novel Adjective ( $M = .30$ ) and No Word conditions ( $M = .39$ ),  $F(1,27) = 6.60$ ,  $p < .025$ . Again, only children in the Novel Noun condition selected category members more often than would be expected by chance,  $t(9) = 1.86$ ,  $p = .05$ , one-tailed; those in the Novel Adjective selected category members

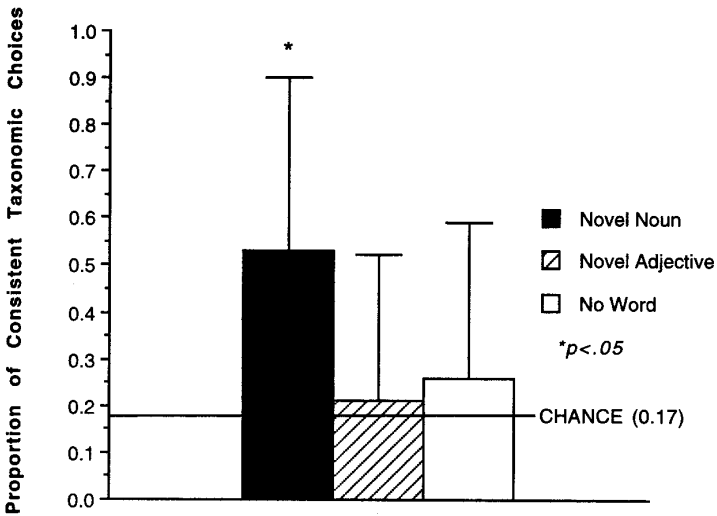


FIG. 4. Experiment 3b (English). Mean proportion of consistently taxonomic selections (tax-tax) as a function of Condition.

less often than would be expected by chance,  $t(9) = -2.07$ ,  $p = .04$ , one-tailed; those in the No Word condition were at chance.

Finally, to examine the effect of age in English-speaking children, we compared the performance of preschool- (taken from Waxman & Kosowski, 1990; Experiment 2) vs school-aged children (Experiment 3b) in the Novel Noun and Novel Adjective conditions. Children in these experiments were presented with identical visual materials, but they were tested by different experimenters and drawn from different locations. There were no reliable differences between these two age groups in either the Novel Noun ( $t(23) = -0.94$ ,  $p > .05$ ) or the Novel Adjective ( $t(23) = -0.19$ ,  $p > .05$ ) conditions, using the rate of consistently taxonomic performance as the dependent measure. This is consistent with the hypothesis preschoolers' performance in the Novel Adjective conditions reflected their sensitivity to the use of adjectives in their native language.

Experiments 3a and 3b are consistent with the hypothesis that experience with different languages does lead to different outcomes in children's expectations for the range of meanings associated with the grammatical category *adjective*. Moreover, these differences appear to reflect language-specific learning and to become stronger with age and language experience. In Spanish, children ranging from 3 to 7 years of age exhibit a consistent tendency toward the taxonomic alternatives in the Novel Adjective condition; this tendency appears to become more entrained with age. In English, where adjectives are not (as a rule) permitted to adopt this semantic function, children do not select the taxonomically related alternatives in the Novel Adjective condition.

However, these comparisons between preschool- and school-aged children should be interpreted with some caution, until they have been replicated in a controlled experimental design conducted during the same time period, by the same experimenter.

### GENERAL DISCUSSION

The series of experiments reported here constitute the first cross-linguistic, developmental test of the noun-category linkage. Although the empirical contribution is itself substantial, the motivation underlying these experiments was of a more theoretical nature. The results shed light on theories concerning the existence, specificity and universality of noun-category linkage. Based upon a review of the cross-linguistic and developmental literatures, we proposed that the linkage between nouns and object categories, which emerges early in English-speaking children, may be a universal phenomenon (Dixon, 1982; Gentner, 1982; Gleitman, 1990; Maratsos, 1991; Pinker, 1994; Waxman, 1994; Waxman & Markow, 1995). Consistent with this proposal, we discovered that children's interpretation of novel words presented as nouns was uniform across the languages examined. The expectation that a novel word, presented as a count noun and applied to an individual object, will be extended to include that object and other members of its superordinate level kind was evident in French- and Spanish-speaking children, just as it has been evident in English-speaking children (Markman & Hutchinson, 1984; Waxman, 1990; Waxman & Kosowski, 1990) and in infants in an English-speaking environment (Waxman & Balaban, 1992; Waxman & Hall, 1993; Waxman & Markow, 1995).

We also conjectured that the specific mappings for adjectives, which appear to emerge later in development, may vary according to the particulars of the language under acquisition (Dixon, 1982; Waxman & Markow, 1995; Wierzbicka, 1986). Consistent with this proposal, we discovered that children's interpretation of novel words presented as adjectives did vary across the languages examined here, clearly implicating an important role for language-specific learning. In English and French, adjectives may be applied to individual objects, but the adjectives do not themselves refer to objects qua objects or to object categories qua object categories (Hall, Waxman, & Hurwitz, 1993; Heibeck & Markman, 1987; Taylor & Gelman, 1988; Waxman, 1990; Waxman, Shipley, & Shepperson, 1991; Wierzbicka, 1986). By the time they are two or three years of age, English- and French-speaking children honor this convention; they reveal no preference for the taxonomic (or thematic) alternatives in the *Novel Adjective* conditions in our categorization task. In contrast, in Spanish, where adjectives are habitually permitted to adopt some of the syntactic and semantic features associated with count nouns, children have learned that adjectives, like nouns, may be used in a categorical sense. For 3- to 7-year-old Spanish speakers, novel words presented as either count nouns or adjectives elicited a consistent preference for the taxonomic alternatives in our superordinate level categorization task. Although this taxonomic

inclination was less pronounced with novel adjectives than nouns, it held up reliably in several different adjectival contexts in Spanish (cf., with or without an overt noun). In addition, this inclination appeared to become stronger with age and increasing language experience. Thus, children acquiring different languages appear to acquire different tacit expectations regarding the range of application associated with the grammatical category *adjective*.

It is certainly not our intention to imply that the grammatical categories *noun* and *adjective* are any less distinct in Spanish than in French and English. Our claim is much more measured. We claim that there is a particular type of reference for which it is appropriate to employ an adjective in Spanish, but not in French or English. More specifically, the type of referring that takes place in our experimental task is within the realm of either adjective or noun use in Spanish, but only within the realm of noun use in English and French. Our experiments reveal that by 3 years of age, children have learned this particular aspect of adjective use in their respective languages and can apply this knowledge as they map new words to their appropriate referents.

Our results suggest that the linkage between count nouns and object categories emerges early and is a candidate for universality, and that the meanings associated with adjectives may be more language-specific. These intriguing results open several challenging avenues for future research. Our results do not specify whether the language universals are a consequence of properties inherent in the human mind (cf., Chomsky, 1965; Grimshaw, 1994; Pinker, 1994) or experiential regularities inherent in the input across languages (cf., Hockett, 1961; Nelson, 1988). Neither do they reveal when and how the language-specific linkages are acquired. (See Hockett, 1961, and Slobin, 1985, for discussions of the promise and perils in seeking to identify language-universals and distinguish them from language-specific aspects.)

For instance, these results do not reveal the basis upon which the Spanish-speakers' taxonomic inclination for novel adjectives is acquired. One possibility is that this inclination is derived from children's early appreciation of the semantic and syntactic features of det-A constructions. Perhaps experience with these constructions serves as a foundation upon which children form a more general expectation regarding adjectives (not only adjectives within det-A constructions) and object categories. The evidence that the taxonomic inclination appeared to become stronger as a function of age is consistent with this possibility. However, it is also possible that the taxonomic inclination reflects a more general feature of the grammatical category *adjective* in the structure of Spanish, one that leads children to discover that an adjective, applied to an individual object, may pick out other members of the same superordinate level object category. Interestingly, traditional Spanish grammars (e.g., Real Academia Espanola, 1973) consider both nouns (*nombres sustantivos*) and adjectives (*nombres adjetivos*) to be members of a common nominal form, *nombre*. If nothing else, this underscores the nominal sense that adjectives can take for native Spanish speakers.

Experiments with children who have just begun to master the det-A con-

struction may permit us to determine whether children initially extend novel adjectives taxonomically only in det-A constructions, and only later generalize from these to constructions including an overt noun. It will also be important to develop methods to examine these phenomena more closely in children older than 7 years of age. Another important direction will be to examine these phenomena in a broader range of languages, including other languages with productive det-A constructions (e.g., German, Italian), as well as languages with a very sparse or restricted grammatical category *adjective* (e.g., the Bantu languages described in Dixon, 1982).

Another goal is to test more precisely children's expectations concerning the full range of applications associated with the grammatical category *adjective* across languages. In the experiments reported here, we have tested specifically for a core feature associated with count nouns: that count nouns canonically and universally refer to objects and categories of objects. However, one limitation of our method is that it cannot reveal more precisely children's interpretations of the adjectives. To overcome this limitation, it would be necessary to include alternatives that share a salient property (e.g., size, texture, color) with the target, but are drawn from a different superordinate level category than the target. In principle, such a design would permit children to extend the novel word either to objects from a common taxonomic category or to objects sharing a common property. We did not include these additional, property-matched alternatives in our task because we suspect that, in practice, adding alternatives to the current design would tax children, introduce noise, and therefore obscure our primary goal of examining the linkage between nouns and object categories. However, in a related line of work, we focus specifically on discovering more precisely children's expectations for the grammatical category *adjective*. In these experiments, we find that by 21 months of age, infants acquiring English as their first language reveal an expectation that adjectives, but not count nouns, can be extended to properties of objects within a familiar basic level kind (Markow, 1995; Waxman & Markow, 1997; Waxman, 1995; also see Prasada, 1992).

Another issue that warrants further research attention is the distinction between word meaning and reference. For although two words or noun phrases (e.g., cop and policeman) may share a common referent, they do not necessarily share a common meaning (E. Clark, 1987). In the experiments reported here, we have shown that the instructions in the Novel Noun and Novel Adjective conditions often lead Spanish-speaking children to pick out the same sets of referents in the context of our object categorization task. Notice, however, that this referential overlap does not in itself constitute evidence that the meaning conveyed by these is identical. An example in English may clarify this point. The phrases *She is a liberal (noun)* and *She is a liberal (adjective) person* can pick out the same individual or group of individuals. Despite this overlap in reference, many have suggested that the nouns carry a distinctly different and richer meaning than do the corresponding adjectives. See Jespersen (1968), Lyons (1977), and Wierzbicka (1986) for theoretical arguments pertaining to this claim and Smith and

Markman (cited in Markman, 1991) and Waxman, Wisniewski, and Carpenter (1996) for empirical evidence.

In sum, the research presented here provides important insights into issues of acquisition. We have proposed that early in acquisition, infants embark upon the task of language acquisition with an expectation that a novel word applied to an object will refer to that object and other members of its kind (Waxman & Markow, 1995). We have also proposed that this initial expectation will become refined or entrained with increasing age and language experience. For example, as children come to distinguish among the grammatical forms presented in the input, this expectation will become more specific. The initial general expectation, coupled with experience with the particular language under acquisition, will lead children to a more specific set of expectations regarding *which* types of words will refer to objects and to object categories. For children acquiring English or French, languages in which count nouns (but not adjectives) typically serve this function, children come to restrict their initial expectation; they come to expect that count nouns in particular (but not adjectives) will refer to object categories. For children acquiring Spanish, experience steers the acquisition process along a slightly different developmental course. Experience with their native language permits an expectation that both count nouns and adjectives can pick out members of object categories. This cross-linguistic variation indicates one way in which language experience shapes one's expectations concerning the particular linguistic devices employed to convey particular aspects of experience.

This discussion bears directly on the interplay between constraints within the child and input from the environment (Gleitman, 1990; Grimshaw, 1994; Newport, 1990; Pinker, 1994; Waxman & Markow, 1996). In our view, these factors are not mutually exclusive. (Also see Gelman & Brenneman, 1994.) The importance of this interplay between constraints within the child and input from the language environment becomes particularly clear when acquisition is considered from a developmental, cross-linguistic vantage point. Children will acquire different languages, depending upon the language community in which they are raised. Language variation is embodied not only in the words used to label concepts (e.g., *dog vs chien vs perro*), but also in the ways in which languages recruit particular linguistic forms to convey particular aspects of experience. What is required is a system that is sufficiently constrained to allow the learner to acquire language, yet sufficiently flexible to take into account systematic variations across human languages.

By synthesizing cross-linguistic and developmental approaches, it has become possible to construct a window through which to view more clearly the linkages between linguistic and conceptual systems of organization. Our account is consistent with the cross-linguistic fact that languages converge in the mappings between nouns and categories of objects, but differ in the ways in which they recruit other grammatical categories to convey other particular types of meaning (Bowerman, 1991; Dixon, 1982; Gentner, 1982; Imai & Gentner, 1993; Jackendoff, 1990; Naigles, Eisenberg, & Kako, 1992;



Naigles, Gleitman, & Gleitman, 1993; Talmy, 1985; Wierzbicka, 1986). An important goal is to continue to clarify when these linkages emerge, how they are shaped by linguistic input, and how they are modulated within the context of the child's existing fund of linguistic and conceptual knowledge.

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