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The effects of learning two languages on levels of metalinguistic awareness*

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Abstract

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The purpose of this study is to determine whether a bilingual environment – the juxtaposition of two language systems learned simultaneously – enhances children's awareness of the language(s) they are learning to speak. The study explores the development of metalinguistic awareness at three different levels of explicit knowledge about language in monolingual children, and assesses the effects of a bilingual experience on this developmental process.

To observe the development of metalinguistic awareness and to test the bilingual hypothesis, we compared metalinguistic skills in 32 Spanish-speaking and 32 English-speaking monolinguals and in 32 Spanish–English bilinguals aged 4:5 to 8:0. The Spanish and English metalinguistic tests each contained 15 different ungrammatical constructions (e.g., "Steven and Robert is a brother") and 15 grammatically correct "fillers." For each item, the children were asked in the appropriate language to **note** *whether the construction was correct or incorrect, to* **correct** *the errors they noted. and to* **explain** *why those errors were wrong.*

We found that the monolingual children followed the same sequence in acquiring the ability to detect, to correct, and to explain grammatical errors; in particular, they progressed from a content-based orientation to a form-based

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orientation to language at each of the three levels. However, we noted **different** *outcomes in terms of the types of grammatical constructions that were easy for monolinguals to master at each level – the constructions that were easy to detect and correct were distinct from those that were easy to explain. The bilingual experience was found to speed the transition from a content-based to a form-based approach to language at certain levels of awareness (detection and correction), but had less of an effect on explanations. Moreover, the bilingual experience did not appear to affect the types of grammatical constructions that were easy to master at any of the three levels.*

These data suggest that the experience of learning two languages hastens the development of certain metalinguistic skills in young children, but does not alter the course of that development. Thus, while learning two languages may enhance a speaker's "ear" for regularities of form, it does not appear to augment his grammatical "mind" for understanding those regularities.

Introduction

The purpose of this study is to determine whether a bilingual environment – the juxtaposition of two language systems learned simultaneously – enhances children's awareness of the language(s) they are learning to speak. In an attempt to assess the child's metalinguistic awareness, we have devised three linguistic tasks which vary in the extent to which they require explicit versus implicit knowledge about language. Thus, this study explores the development of metalinguistic awareness at three different levels of explicit knowledge about language in monolingual children, and assesses the effects of a bilingual experience on this developmental process.

Learning to talk versus learning to talk about talk

Using language to communicate is a skill achieved by children experiencing a wide range of environments and thus can be considered a robust phenomenon (cf. Wimsatt, 1981). Despite great variability among cultures in the patterns of child–caretaker communications (e.g., Miller, 1982; Ochs, 1982; Pye, 1986; Schieffelin, 1979), virtually all children in all cultures learn to talk or sign (Slobin, 1985). Even children experiencing an environment that varies dramatically from the typical (such as no exposure to an established language) have been shown to communicate in a language-like fashion (Feldman, Goldin-Meadow, & Gleitman, 1978; Goldin-Meadow, 1979; Goldin-Meadow & Mylander, 1984, 1989).

In contrast to learning to talk, learning to talk about talk may be a less

resilient process, influenced by differences across learners and across learning environments. For example, adults have been shown to differ in their ability to paraphrase novel compound nouns, a task requiring subjects to pull back and consider the structural form of their language (Gleitman & Gleitman, 1970). Gleitman and Gleitman (1970) found that, when taxed with a difficult compound noun, PhD candidates were biased to attend to the surface syntactic properties of the stimulus, while clerical workers were biased to attend to the plausible semantic interpretations of the separate words in the stimulus. Gleitman and Gleitman concluded that "the ability to manipulate the superficial levels of language structure in non-communicative settings is a property of linguistically able (or experienced) individuals" (Hirsh-Pasek, Gleitman, & Gleitman, 1978, p. 110).

As a second example of variability in the ability to reflect on language, individuals who are poor readers have been shown to perform less well on metalinguistic tasks than individuals who are good readers. Poor readers do not perform well on tasks involving conscious manipulation of phonological units (Liberman, Shankweiler, Fischer, & Carter, 1974; Mann & Liberman, 1984) or syntactic units, such as providing the missing morpheme or word in a construction (Fletcher, Satz, & Scholes, 1981; Rubin, 1984; Wiig, Semel, & Crouse, 1973) or detecting and correcting ungrammatical constructions (Bohannon, Warren-Leubecker, & Helper, 1984; Bowey, 1986; Flood & Menyuk, 1983; Killey & Willows, 1980; Ryan & Ledger, 1984; Scholl & Ryan, 1980; Willows & Ryan, 1982; for an extensive review, see Fowler, 1988). Finally, the experience of learning how to read has been found to promote metalinguistic awareness (Morais, Carey, Alegria, & Bertelson, 1979).

Factors influencing the development of metalinguistic awareness in children

What are the factors underlying differences across children in the development of their ability to reflect on language? One such factor appears to be a young child's experience with language in general (Clark, 1978) and, in particular, a child's experience learning two languages simultaneously in a bilingual environment (Clark, 1978; Slobin, 1978; Vygotsky, 1962).

Evidence gathered from a wide range of bilingual environments suggests that a milestone in early bilingualism is learning to differentiate the two language codes being learned. This differentiation appears to develop gradually (Burling, 1959; Fantini, 1976; Imendadze, 1966; Leopold, 1949; Swain, 1974; Volterra & Taeschner, 1978). Up to the age of 2, children exposed to two languages appear for the most part to have only one linguistic system, developed in much the same manner as the linguistic system of monolingual

children. The only difference is that the bilingual child's system is a mixed one, incorporating features from both language models. During the third year, one code gradually unfolds into two, and each language is assigned fairly rigidly to the person who speaks it or to the context in which it typically occurs. The phonological and lexical aspects of the two codes are usually separated first, followed by a separation of syntactic aspects. Finally, by the age of 3–4, bilingual children begin to decontextualize their language and realize that they speak two distinct languages. It is at this moment that bilinguals exhibit a variety of explicit metalinguistic behaviors, for example, they begin to translate spontaneously and ask for translations, tag constructions according to their linguistic affiliation, and sharply reduce mixing of the two codes (Hakuta, 1986).

We suggest that learning to differentiate two language codes necessarily entails extensive attention to the form of language (as opposed to its message) – first in an unconscious manner, later more explicitly. According to several cognitive models of skill acquisition and utilization (e.g., Anderson, 1982; Shiffrin & Schneider, 1977; Sternberg, 1984), the ability to focus on form extensively enough to differentiate two codes ought to entail not only developing procedures for accomplishing this differentiation, but also automatizing those procedures so that they become more generally available to conscious access. Thus, bilingual children may have procedures (which they can consciously execute with ease) for dealing with the forms of their languages – procedures which could easily provide the foundation for explicit judgments about linguistic form.

Although explicit attention to the form of language may be necessary to distinguish the two codes when acquiring two languages simultaneously, conscious attention to linguistic form may not be as essential when acquiring a first, and only, language. As a result, we hypothesize that the bilingual experience should serve to enhance the development of metalinguistic abilities in young children, compared to the monolingual experience. The goal of this study is to test this hypothesis. To do so, we compared the development of metalinguistic skills in monolingual children fluent in either English or Spanish to the skills of a matched group of bilingual children fluent in both English and Spanish.

Accessing levels of metalinguistic awareness

Monolingual children begin to refer explicitly to linguistic cues to explain grammatical errors at ages 5–6 (Gleitman, Gleitman, & Shipley, 1972; Hakes, 1980). However, there is evidence that children are sensitive to linguistic cues earlier in their development. For example, Karmiloff-Smith (1986) found

that children show sensitivity to linguistic markers in spontaneous repairs of their own speech at the age of 4, but do not give explicit metalinguistic judgments based on those same linguistic markers until age 6. In a review of the developmental literature, Clark (1978) shows that children provide evidence of linguistic awareness first by spontaneously repairing their own speech, later by correcting the utterances of others, and finally by explaining why certain sentences are possible and how they should be interpreted. Thus, there appears to be a developmental continuum based on the explicitness of awareness, the endpoint being overt verbalized metalinguistic judgments.

It is possible that different experiences with language promote metalinguistic awareness at one level of explicitness but not at other levels. As an example, learning to read has been found to have an effect on the ability to correct grammatical errors but no effect on the ability to note grammatical errors in adults (Scribner, & Cole, 1981). Moreover, the correcting task, but not the noting task, has been found to correlate with reading ability in second-grade children (Fowler, 1988).

In order to explore the effects of learning one and two languages on different levels of metalinguistic awareness, we tested the child's sensitivity to grammaticality at three different levels: the children were asked to *note* errors in ungrammatical sentences, to *correct* those errors, and to *explain* why those errors were wrong. We chose these three tasks because they appear to reflect a continuum from implicit to explicit knowledge about language required to perform each task correctly.

It has been suggested that very young children's ability to spontaneously repair their own speech might be the result of an error-detecting mechanism that runs without any need for conscious awareness (Karmiloff-Smith, 1986; Marshall, & Morton, 1978) and that leaves little or no trace of structural information in memory (Levelt, Sinclair, & Jarvella, 1978; Marshall, & Morton, 1978). This same unconscious error-detecting mechanism could account for the ability to detect or *note* ungrammaticality in the speech of others.

Correcting an error is more complicated, as it requires both the ability to detect the error at the outset, as well as the ability to process the ungrammatical construction exhaustively and retain it in short-term memory long enough to generate a correct sentence associated with the incorrect form (Fowler, 1988). An unconscious error-detector which leaves no trace of structural information in memory cannot easily account for the development of the ability to correct grammatical errors.

The most explicit metalinguistic skill developed by young children is the capacity to *explain* a grammatical error. In addition to detecting an error and correcting it (which merely entails generating a good-sounding sentence associated with the incorrect form), a child giving an explanation must also

demonstrate explicit and articulate knowledge of the rules underlying the corrected sentence. Thus, the tasks of detecting, correcting, and explaining ungrammaticality appear to differ systematically in the level of explicit knowledge of language required to perform each task.

This study explores the development of these three levels of metalinguistic awareness in monolingual children learning either English or Spanish, and compares that development to the development of the three levels of metalinguistic awareness in bilingual children learning both English and Spanish simultaneously. The hypothesis to be tested is that simultaneous acquisition of two language systems promotes metalinguistic awareness at different levels of explicitness in young children.

Method

Subjects

The subjects in this study were 64 monolingual and 32 bilingual children. Of the monolinguals 32 were Spanish-speaking children from a parochial school in El Salvador; the other 32 monolinguals were English-speaking children tested in two parochial schools in New Haven, Connecticut. The 32 bilingual children were Spanish–English bilinguals tested in the American School in El Salvador. There were three age groups within each language group corre-

Table 1.

	PK		K		1st Grade	
	No. of children	Mean age (SD)[a]	No. of children	Mean age (SD)	No. of children	Mean age (SD)
English monolinguals	6F, 1M[b]	4 :10 (4.2)	5F, 6M	6 : 0 (4.1)	9F, 5 M	7 : 2 (4.6)
Spanisn monolinguals	4F, 3M	4 : 11 (4.5)	5F, 6M	6 : 0 (3.8)	7F, 7M	7 : 0 (5.0)
Bilinguals	4F, 3M	4 : 11 (4.4)	8F, 3M	6 : 0 (4.4)	11F, 3M	7 : 2 (4.7)

[a]Mean ages are in years: months. Standard deviations are in months.

[b]The number preceding the F indicates the number of female subjects in that group; the number preceding the M indicates the number of male subjects in the group.

sponding roughly to pre-kindergarten (PK), 4:5–5:5 (N = 7),[1] kindergarten (K), 5:6–6:5 (N = 11), and 1st grade, 6:6–8:0 (N = 14, see Table 1). Analyses of variance revealed no statistically significant difference in mean age across language groups at each age level.[2]

The 32 bilingual children were selected initially. All subjects within the desired grades who were considered bilingual by their teachers were tested for proficiency in their two languages on the Bilingual Syntax Measure (BSM) (Burt, Dulay, & Hernandez, 1979). Only those bilinguals categorized as "Intermediate" or "Proficient" in both languages according to the rating scale suggested by the BSM were included in the study. The monolingual children were then matched to the bilingual children on age, intellectual development (as measured by the Raven Coloured Progressive Matrices), and sex. Sex was not found to be significantly correlated with any of the dependent measures described below and, as a result, will not be considered further in our analyses.

Materials and procedure

Intellectual ability

The first task administered to all subjects individually was the Raven Coloured Progressive Matrices. A raw score based on the number of correct responses was calculated and used as a measure of intellectual ability.

Language proficiency and balance

Proficiency. The BSM was then administered to all subjects. This standardized task (Burt et al., 1979), designed to measure Spanish and/or English proficiency, consists of 7 pictures and 25 questions about the pictures in each of the two language versions. Each monolingual child was tested individually with the version appropriate to his language background. Each bilingual child was administered in separate sessions the two language versions of the BSM in counterbalanced fashion. Responses were tape-recorded and later trans-

[1]We considered it essential to include pre-school children in our sample simply because, in older children, the effects of schooling on metalinguistic awareness might have confounded any effects of bilingualism.

[2]Since the children belonged to two different cultures, particular attention was paid to selecting schools where the student body was of comparable socio-economic status and where the educational practices were as similar as possible. The children in all three language groups belonged to the middle class. However, in the kindergarten group, the scholastic environment for the English monolinguals was somewhat more formal (with, for example, performance objectives for reading) than for the bilinguals or for the Spanish monolinguals.

cribed. A raw score based on the number of ungrammatical responses was derived for each child, and was used to classify children into four proficiency levels ranging from low-intermediate to fully proficient.[3]

Balance. The BSM was also used to derive a measure of linguistic balance for the bilingual children. Three levels of balance were established based on the raw score differential in the two languages: balanced (at the same proficiency level in both languages); slightly unbalanced (at a proficiency level in one language which was 1 step higher than the proficiency level in the other language); and unbalanced (at a proficiency level in one language which was 2 or more steps higher than the proficiency level in the other language).[4]

Metalinguistic ability

Selecting the items on the test. Traditionally, metalinguistic awareness in preschool and early elementary school children has been assessed by asking children to note errors in sentences and to correct them. In many of these experiments, the errors involved violations of selectional restrictions, such as between the subject and the verb (e.g., "the rock walked down the hill"), the verb and the object (e.g., "ride the picture"), or a noun and an adjective (e.g., "the happy pencil rolled off the desk" (de Villiers & de Villiers, 1972; Hakes, 1980; Howe & Hillman, 1973; James & Miller, 1973). Note that the assertion made in sentences of this type is strikingly inconsistent with world knowledge. Thus, a young child could correctly identify such a sentence as unacceptable not because he knows that the form of the sentence violates a particular grammatical rule of English, but because the meaning of the sentence violates what he knows to be true about the world.

Only a few experiments have examined children's ability to note and correct ungrammatical sentences which have plausible and interpretable readings. In order to correctly identify such sentences as unacceptable, a child must be aware, at some level, that the *form* of the sentence is incorrect and that a grammatical rule of English has been violated. For example, Gleitman et al. (1972) presented children with plausible sentences in which number agreement was violated (e.g., "Claire and Eleanor is a sister"), articles were

[3]The four proficiency levels were defined as follows: low-intermediate (8–10 errors out of 25 responses), intermediate (6–7 errors), highly proficient (3–5 errors), and fully proficient (0–2 errors). Our "fully proficient" category corresponded to the "Proficient" category suggested by the BSM, while our other 3 categories all fell within the "Intermediate" rating suggested by the BSM.

[4]Note that because of our subject selection, an unbalanced bilingual could, at worst, be at the low-intermediate level of proficiency in one language and at the fully proficient level in the other language.

omitted ("boy is at the door"), or the inappropriate pronominal referent was chosen (e.g., "I saw the queen and you saw one"), while Ryan and Ledger (1979) used plausible sentences with violations in wh-questions, negatives, articles, irregular verbs, and separable verbs (see also Beilin, 1975). In general, these studies have found that 4- and 5-year-old (monolingual) children can detect or correct errors of form in otherwise plausible sentences in only a few instances, while children of 6 and older are more generally able to do so.

Previous studies of children's ability to judge grammaticality have, however, been limited in three respects. First, in previous work, children were asked to detect errors in a relatively restricted range of grammatical constructions. As a result, the studies give little sense of the breadth (or limit) of these metalinguistic abilities in children of different age groups. Second, previous studies have not for the most part asked children to explain the errors noted (but see Karmiloff-Smith, 1986; Gleitman et al., 1972). These studies have therefore failed to examine an important level of metalinguistic awareness – a child's explicit knowledge of the rules of his language. Finally, previous studies have focused almost exclusively on metalinguistic abilities in children learning English, and therefore cannot determine whether the patterns of metalinguistic development identified for English-learners hold true for children learning other languages.

Our tasks were designed so that we would be able to explore the development of metalinguistic abilities in two languages – English and Spanish – and in three groups of children – one group whose native language was English, one group whose native language was Spanish, and a third group who were bilingual in English and Spanish. The children were asked to note, correct, and explain errors in ungrammatical constructions which have plausible and interpretable meanings. These types of constructions were chosen deliberately in order to examine children's knowledge about the form of their language rather than about their world. To achieve breadth in the task, 15 different types of error were represented in the ungrammatical constructions used in both the English and Spanish tests.

Construction of the task. In order to balance the metalinguistic tasks given to the bilingual children with those given to the monolingual children, four versions of the metalinguistic test were designed: two in Spanish and two in English. Each version contained 15 ungrammatical constructions (each representing a different type of error) and 15 grammatically correct sentences (fillers). The order of these constructions was randomized independently for each version.

The 15 ungrammatical constructions in version A and the 15 in version B are presented in Table 2 for Spanish and in Table 3 for English. All the

Table 2. *Ungrammatical sentences in the Spanish metalinguistic task*

Error type	No.	Sentence
Irregular verb	1A	*Poní los juguetes en la cama "I puted the toys on the bed"
	1B	*Le decí adiós a Carmen "I sayed good-bye to Carmen"
Word order	2A	*Mi mamá los me compro "My mother bought them me"
	2B	*El está lo vendiendo "He is it selling"
Gender agreement (article/noun)	3A	*El flor tiene muchos colores "The (m.) flower (f.) has many colors"
	3B	*Papá corto la gran arbol "Father cut the (f.) big tree (m.)"
Gender agreement (noun/adjective)	4A	*El pescado es bien bonita "The fish (m.) is very pretty (f.)"
	4B	*La casa es pequeño "The house (f.) is small (m.)"
Number agreement (coordinate noun/verb)	5A	*El perro y el gato comió bien "The dog and the cat ate (sing.) well"
	5B	*Pablo y José es un primo "Pablo and José is a cousin"
Comparative	6A	*Este pastel es el peor que el otro "This cake is the worst than that one"
	6B	*Juan es el más gordo que David "Juan is the fattest than David"
Object marker (animate/inanimate)	7A	*Siempre peino mi hermano "I always comb (–) my brother"
	7B	*Ella seca a la ropa "She dries (*a*) the clothing"
Lack of article	8A	*Gato se tomó la leche "Cat drank the milk"
	8B	*Niño juega con muñecas "Boy plays with dolls"
Possessive marker	9A	*El pastel tu mami es rico "The cake your mother is good"
	9B	*El bus el señor es café "The bus the man is brown"
Object marker (subject/object)	10A	*Beatriz peinó María "Beatriz combed (–) Maria"
	10B	*Pablo aruñó el niño "Pablo scratched (–) the boy"
Pronoun agreement (definite/indefinite)	11A	*Ví el carro y tu viste uno "I saw the car and you saw one"
	11B	*Conocí a Luis y el conoció a uno "I met Luis and he met one"

Table 2. *(Continued)*

Error type	No.	Sentence
Adverb/verb agreement (time/tense)	12A	*Ayer estoy limpiando el barco "Yesterday I am cleaning the boat"
	12B	*Comí muchos dulces mañana "I ate many candies tomorrow"
Pronominal verb (marked with "se")	13A	*Yo siento muy mal "I (–) feel very bad"
	13B	*Pedro se parece estar triste "Pedro resembles to be sad"
Wrong verb ("es" vs. "está")	14A	*Ella es en mi casa "She is (perm.) in my house"
	14B	*Él está un niño muy bueno "He is (loc.) a very good boy"
Selectional rstr.	15A	*El lapiz buscó a mi prima "The pencil looked for my cousin"
	15B	*El payaso alegra el juguete "The clown makes the toy happy"

constructions on the two language tests except item 15 (selectional restrictions) were grammatically unacceptable but contained plausible content (assuming that a reading was derived despite the error). Note that there were two tokens for each of the 15 errors on both the Spanish and English tests: one token in version A and one in version B.[5] Performance on the two versions in each of the languages did not differ, and the reliability coefficient was greater than .80 for each of the four versions.

Administration of the task. The monolingual children were tested individually and received both versions (A and B) of the metalinguistic task in the appropriate language, each in a separate session.[6]

The bilingual children were also tested individually and received two versions of the metalinguistic task in separate sessions, but one version was in English and the other in Spanish. If a child received version A in Spanish,

[5]The two tokens were matched on length and, whenever possible, on level of difficulty. In addition, whenever possible, versions A and B on the Spanish test were matched with versions A and B on the English test in terms of error type, length of items, and level of difficulty.

[6]To control for order effects, the order of presentation of the two versions was counterbalanced. No statistically significant difference was found in the number of errors noted when a version was taken either first or last. The order of presentation of items within each version was also counterbalanced.

Table 3. *Ungrammatical sentences in the English metalinguistic task*

Error type	No.	Sentence
Irregular verb	1A	*The little boy eated the cookies
	1B	*My father bringed me a black dog
Word order	2A	*Alexandra bought it me
	2B	*The doctor is it selling
Adverb/adjective	3A	*The smartly boy read very quickly
	3B	*The colorfully bird sang loudly
Number agreement	4A	*Many door are completely broken
(singular noun/verb)	4B	*The shoe are very pretty
Number agreement	5A	*The fat cow and the horse eats a lot
(coordinate noun/verb)	5B	*Steven and Robert is a brother
Comparative	6A	*This animal is the most beautiful than that one
	6B	*Jonathan is the fattest than Mike
Mass noun	7A	*Catherine drinks waters at night
	7B	*William puts milks on his cereal
Lack of article	8A	*Dog licked the yellow plate
	8B	*Boy jumped over the high wall
Possessive marker	9A	*The teacher coat is very dirty
	9B	*My mother car is parked outside
Case	10A	*Them often come to dinner
	10B	*Him eats a lot of candies and cookies
Pronoun agreement	11A	*I saw the pretty flower and you saw one
(definite/indefinite)	11B	*Yesterday I met Susan and you met one
Adverb/verb agreement	12A	*Yesterday I am cutting the grass
(time/tense)	12B	*Richard danced very well tomorrow
Reflexive pronoun	13A	*He dressed myself every day
	13B	*You washed himself this morning
Preposition	14A	*We go to school in Monday
	14B	*Leslie's birthday is on December
Selectional rstr.	15A	*Tennis plays my older brother
	15B	*Catherine bothered the big tree

he or she received version B in English, and vice versa. When items were alike in the two languages (e.g., item 5 in Tables 2 and 3), the same version in the two tests (e.g., version A in English and version A in Spanish) contained those items so that the bilingual child would not be tested twice on exactly the same item.

The testing session proceeded as follows: (1) The child heard the utterance and was then asked: "Is that the right way to say it? (¿Así se dice?)" (2) If the child noted the error, he was then asked to correct the sentence: "Well, what's the right way to say it? (¿Como se dice pues?)" (3) Finally, he was

asked to explain the error: "Well, why can't you say it like that? (¿y porqué no se puede decir así?)" A practice session was conducted before the testing session in which the child was guided through the above steps. During the practice, errors were pointed out to the child if he had not noticed them and he was helped with corrections and explanations. Only those children who were able to direct their attention to errors and seemed to understand the nature of the task during the practice session were included in the study. Three children (all of whom were English-speaking monolinguals in the PK group) were unable to complete the practice session and thus were dropped from the study. The entire testing session was audio-recorded and later transcribed.

Scoring of responses. Responses to the 15 ungrammatical constructions in each version were scored first for *number of errors noted.* A response was scored as 1 if the child noticed an error in the construction (i.e., said the sentence was not right) and as 0 if he failed to notice the error. Responses to the 15 grammatically correct filler sentences in each version were examined separately, and the number of times a child noted an error on a correct sentence was recorded.

If a child correctly noted an error on one of the 15 ungrammatical constructions, he was asked to correct the error and his response was coded for *type of correction.* The primary coding decision was a determination of whether the correction was grammar-oriented or content-oriented.

A correction was coded as "grammar-oriented" if a child corrected the perceived error in the grammar without also making a substantial and unwarranted change in the content of the construction. Two types of corrections met this criterion (see Table 4): (1) a morphological or syntactic strategy was used to correct the error without otherwise altering the construction (as in examples 1–3); or (2) a lexical strategy was used to correct the error (as in examples 4–5).[7]

A correction was coded as "content-oriented" if the child made a substantial change in the propositional content of the construction when this change was not warranted. The change in meaning could either eliminate the grammatical error in the original construction (as in examples 6–7 in Table 4) or

[7]If a sentence contained a second correction along with the morphological/syntactic correction (or the lexical correction), the sentence was coded as an example of a grammar-oriented correction *only if* the additional change did not substantially alter the meaning of the sentence, for example, when correcting the construction, "The shoe are very pretty," a child produced the sentence, "The shoe is pretty," thereby appropriately changing the tense of the verb from "are" to "is" but in the process omitting the adverb "very" – a change which did not greatly alter the meaning of the sentence.

Table 4. *Examples of types of corrections*

Ungrammatical construction	Correction
Grammar-oriented corrections	
Morphological/syntactic	
1. *The shoe are very pretty	The shoe is very pretty
2. *The doctor is it selling	The doctor is selling it
3. *Dog licked the yellow plate	The dog licked the yellow plate
Lexical	
4. *Richard danced very well tomorrow	Richard danced very well yesterday
5. *He dressed myself every day	I dressed myself every day
Content-oriented corrections	
6. *Him eats a lot of candies	He shouldn't eat a lot of candies and cookies
7. *The doctor is it selling	The doctor is checking
8. *Catherine drinks waters at night	*Catherine drinks waters at day
9. *The little boy eated the cookies	And he'll get fat

fail to correct the error (as in examples 8–9). A correction was coded as "no response" if the child provided no correction of any kind. To determine the reliability of our coding scheme for corrections, 10% of the corrections were recategorized by a second trained coder working independently. Reliability between the two independent coders ranged between 96% and 99%, depending upon the coding category.

Finally, if a child had noted an error on one of the ungrammatical constructions, he was asked to explain his objection and his response was coded for *type of explanation*. Here again, the primary concern was to determine whether the child's explanation reflected attention to the grammatical properties or the propositional content of the construction.

An explanation was coded as "grammar-oriented" if the child made reference in his explanation to the linguistic properties of a construction. Two types of explanations met this criterion (Table 5): (1) the child referred to the rule he believed had been violated, either directly (as in example 1) or indirectly (as in example 2); the rule the child mentioned could either be the rule that was actually involved in the error (i.e., "accurate" as in examples 1–2), or a rule that had no bearing on the error (i.e., "misguided" as in example 3, where the child flagged plurality as the problem when the real difficulty involved case; see also example 4); or (2) the child pinpointed the error without elaborating further on the nature of the error (as in examples 5–7).

An explanation was coded as "content-oriented" if it expressed the child's

Table 5. *Examples of types of explanations*

Ungrammatical construction	Explanation
Grammar-oriented explanation	
Rule-based	
Accurate	
1. *Many door are completely broken	Because you have the words "many" and "are" there; they mean "two" but "door" means "one" so you have to say "doors"
2. *Many door are completely broken	Because there are a lot of doors in your sentence
Misguided	
3. *Him eats a lot of candies and cookies	There is only one boy, you have to say "he"
4. *Him eats a lot of candies and cookies	"Him" is not a word
Pinpointing	
5. *The smartly boy read very quickly	"Smartly" is wrong
6. *The smartly boy read very quickly	The "ly" is wrong
7. *The smartly boy read very quickly	Because you are supposed to say "smart"
Content-oriented explanation	
8. *Many door are completely broken	A door can't be broken a lot
9. *Him eats lots of candies and cookies	Because he'll get a stomach ache
10. *The doctor is it selling	Because that means he'll sell himself and doctors shouldn't do that

reason for rejecting the propositional content of the utterance with no indication that the child had considered the linguistic properties of the utterance (as in example 8, where the child rejected the proposition because he felt it was not true of the world; see also examples 9–10 in Table 5). An explanation was coded as "no response" if the child said he did not know how to explain the error, or if he suggested that there was something wrong with the sentence but made no specific comments on either the grammatical properties or the content of the construction (e.g., "it sounds silly," "it doesn't sound right," "it's wrong," "it's hard to say," "people wouldn't understand you," "because my mother told me not to say it like that"). To determine the reliability of our coding scheme for explanations, 10% of the explanations were recategorized by a trained coder working independently. Reliability between the two independent coders ranged between 96% and 98%, depending on the coding category.

Analyses

Analyses were divided into three parts and the results of the study will be organized around these three divisions. We first present descriptive data on the intellectual ability and proficiency of the children in our sample. We next describe the performance of the monolingual subjects on the metalinguistic task, focusing primarily on developmental patterns of the acquisition of metalinguistic skills. Finally, we compare the performances of the bilingual children and the monolingual children on the metalinguistic tasks and, by inference, attempt to determine the effect of the bilingual experience on metalinguistic awareness.

Intellectual ability and proficiency

Intellectual ability

The mean Raven score for every group fell between the 50th and 75th percentile and no significant differences were noted in mean Raven score adjusted for age across age and language groups. The raw Raven score adjusted for age was used to correlate intellectual ability with sex, language proficiency, and the three metalinguistic skills studied. No significant correlations between Raven score (with age partialled out) and the dependent measures were found.

Language proficiency and balance

Proficiency. All of the monolingual children were highly proficient in their language. However, as might be expected, the PK children in both language groups were on average less proficient than the K and 1st Grade children, most of whom were fully proficient in their native tongue.

All but 4 of the bilingual children were highly proficient or fully proficient in Spanish, with only one child (a 1st Grader) at the low intermediate proficiency level. A two-way analysis of variance performed on the Spanish-speaking monolinguals and the bilinguals in Spanish revealed no significant main effect of age or language group on linguistic proficiency, and no significant interaction between age and language group.

In English, the 1st Grade bilingual children were all either highly proficient or fully proficient. However, 40% of the PK and K bilingual children were of low-intermediate or intermediate proficiency in English. A two-way analysis of variance performed on the English-speaking monolinguals and the bilinguals in English revealed a significant main effect of age group ($F(2,58)$

= 5.49, $p < .01$) and language group ($F(1,58) = 26.65$, $p < .0001$) on linguistic proficiency, as well as a significant interaction ($F(2,58) = 4.37$, $p < .05$) between age and language group. In the PK and K groups, the bilinguals were significantly less proficient in English than were the monolinguals (.05-level, Newman-Keuls). Moreover, within the bilingual group, the 1st Grade children were significantly more proficient in English than either the PK or K children (.05-level, Newman-Keuls).

Balance. Only one of the 7 PK bilinguals (14%) was found to be balanced and 60% were found to be unbalanced. In contrast, 50% of the K and 1st Grade bilinguals were balanced and only 20% were unbalanced. In most cases, the unbalanced children were at the highly or fully proficient level in Spanish but at the low-intermediate or intermediate level in English.

Types of bilingual experience. We identified four general types of bilingual experiences in our bilingual subject population, but found no clear relationship between type of bilingual experience and level of linguistic proficiency and balance. (1) Fifteen of the bilingual children in our sample were raised in Spanish- and English-speaking home environments in El Salvador. Most of these children were highly or fully proficient in Spanish but varied from the low-intermediate to the fully proficient level in English. (2) Five of the bilingual children had American parents who spoke English at home and had moved to El Salvador several years ago where they learned Spanish. Two of these children were more proficient in Spanish than English, two were more proficient in English than Spanish, and one was highly proficient in both. (3) Six of the bilingual children had been raised in the United States speaking Spanish in the home to both parents, English out of the home, and had recently moved to El Salvador. Most of these children were at least highly proficient in both languages, but one child was highly proficient in Spanish while only low-intermediate in English. (4) Six of the bilingual children (all in the 1st Grade) had been raised speaking Spanish in El Salvador and had learned English at the American school which they had attended since pre-kindergarten. All of these children were at least highly proficient in both languages.

The development of metalinguistic skills in monolingual children

Errors noted

Developmental patterns in errors noted

Table 6 presents the mean number of errors noted in the 30 ungrammatical constructions (15 per version) by the Spanish-speaking and the English-speaking monolinguals. The PK children in both language groups noted on average 27% of the errors in the ungrammatical constructions, while the 1st Grade children noted 56% of the errors in the Spanish-speaking group and 63% of the errors in the English-speaking group. Tests of linear trend indicate that this increase in the number of errors noted is significant in both the Spanish-speaking monolinguals ($F_{reg}(1,29) = 11.90$, $p < .01$; res., n.s.) and the English-speaking monolinguals ($F_{reg}(1,29) = 15.61$, $p < .01$; res., n.s.).

What does this developmental change in the number of errors noted suggest about the children's metalinguistic development? If it were the case that the older children were reporting a substantially greater number of errors in the correct sentences which served as fillers than the younger children, a developmental increase in the number of errors noted in the ungrammatical sentences might simply suggest a growing tendency to attend to the content of a sentence and disagree with it. If, on the other hand, the older children (accurately) reported no or few errors in the fillers, it would be more likely that the increase in the number of errors noted in the ungrammatical constructions actually reflected an orientation towards the linguistic properties of the sentences.

The Spanish-speaking monolinguals on average reported errors in 3.14 (10%) of the fillers in PK, 1.27 (4%) in K, and .57 (2%) in 1st Grade. Similarly, the English-speaking monolinguals on average reported errors in 2.57 (9%) of the fillers in PK, 1.64 (5%) in K, and 1.21 (4%) in 1st Grade.

Table 6. *Mean number of errors noted by Spanish-speaking and English-speaking children*

Language group	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Spanish	8.14	(2.14)	11.00	(1.75)	16.79	(1.33)
English	8.14	(1.61)	17.36	(1.88)	18.93	(1.67)

Note: The number of errors noted is based on a possible 30, i.e., 15 per version.

If we were to correct the number of errors noted in the ungrammatical constructions for the number of errors incorrectly noted in the fillers, the difference between the PK and 1st Grade groups would be that much greater.

Examining more closely the course of developmental change in the two language groups, we note that performance improved significantly between K and 1st Grade for the Spanish-speaking group (.05-level, Newman-Keuls; overall $F(2,29) = 6.99, p < .01$) and between PK and K for the English-speaking group (.05-level, Newman-Keuls; overall $F(2,29) = 8.23, p < .01$). This difference in the timing of the developmental change could be due to differences in the Spanish and English versions of the test; although the versions in the two languages were designed to be as comparable as possible, the types of errors on the Spanish test might still have been more difficult to note for the K children than the types of errors on the English test. More interestingly, however, it is also possible that differing educational practices in the two countries accounted for the difference in performance in the two K groups. As mentioned above (footnote 2), the scholastic environment was more academically oriented for the K English-speaking monolinguals than for the K Spanish-speaking monolinguals, emphasizing the types of reading and writing readiness skills thought to promote metalinguistic awareness (cf. Morais et al., 1979). Thus, a more formal schooling experience might have facilitated the development of metalinguistic awareness in the English-speaking K group relative to the Spanish-speaking K group.

Effect of proficiency on errors noted

After determining that regression slopes and variances were homogeneous, we performed an analysis of covariance adjusted for the effect of age on the entire English-speaking monolingual sample in an effort to increase cell size. We found that the 21 fully proficient children noted a greater adjusted mean number of errors than the 11 highly proficient children ($F_{cov}(1,29) = 5.96, p < .05$). A significant effect was not found in the Spanish-speaking monolinguals, probably because there was not enough variance in proficiency within the population since most of the children were fully proficient.

Types of errors noted

The Spanish and English versions of the metalinguistic test each contained 15 different types of ungrammatical constructions. To determine whether there were any patterns in the types of errors the children found easy to note, we calculated the proportion of errors noted by the PK, K, and 1st Grade children combined for each item on the Spanish test (Table 7A) and on the English test (Table 7B). We then divided the 15 constructions in each language into three groups based on the proportion of errors noted across the

Table 7. *Proportion of errors noted, corrected, and explained for each grammatical construction*

A. The Spanish test

Item no.	Grammatical construction	Proportion of errors noted	Proportion of grammar-oriented corrections[a]	Proportion of grammar-oriented explanations[a]
4	Gender agreement (n./adj.)	.80	.88	.65 (.55)[b]
3	Gender agreement (n./art.)	.70	.96	.55 (.50)
2	Word order	.69	.95	.00 (.00)
8	Lack of article	.55	.43	.38 (.19)
9	Possessive marker	.52	.82	.09 (.09)
13	Pronominal verb	.50	.91	.48 (.32)
15	Selectional restrictions	.45	.76	.72 (.69)
14	Wrong verb	.44	.86	.36 (.20)
10	Object marker (subj./obj.)	.38	.79	.29 (.05)
7	Object marker (an./inam.)	.36	.78	.36 (.09)
12	Adverb/verb agreement	.34	.95	.81 (.71)
1	Irregular verb	.30	.84	.00 (.00)
5	Number agreement (coor. n.)	.22	.93	.64 (.43)
6	Comparative	.14	.78	.00 (.00)
11	Pronoun agreement	.09	.67	.26 (.17)

B. The English test

Item no.	Grammatical construction	Proportion of errors noted	Proportion of grammar-oriented corrections[a]	Proportion of grammar-oriented explanations[a]
7	Mass noun	.77	1.00	.57 (.20)[b]
2	Word order	.70	.82	.14 (.02)
8	Lack of article	.69	.89	.73 (14)
4	Number agreement (sing. n.)	.67	1.00	.79 (.51)
10	Case	.64	.95	.51 (.02)
12	Adverb/verb agreement	.63	.95	.79 (.64)
13	Reflexive pronoun	.56	1.00	.50 (.31)
9	Possessive marker	.53	.97	.56 (.30)
15	Selectional restrictions	.52	.82	.76 (.70)
14	Preposition	.44	.96	.73 (.46)
1	Irregular verb	.42	1.00	.64 (.07)
5	Number agreement (coor. n.)	.42	.96	.69 (.31)
11	Pronoun agreement	.41	.81	.50 (.23)
3	Adverb/adjective	.30	1.00	.63 (.16)
6	Comparative	.30	1.00	.37 (.20)

[a]Proportions are based on the number of errors noted.

[b]The number in parentheses is the proportion of errors noted that were given accurate rule-based explanations.

entire sample of children: Easy (the 5 most frequently noted errors), Intermediate (the next 5 most frequently noted errors), and Hard (the 5 least frequently noted errors). The ranking of constructions into Easy, Intermediate, and Hard seen in Table 7 was stable across the age groups, with two exceptions: no. 12 fell in the Intermediate category and no. 10 fell in the Hard for the 1st Grade Spanish group, and no. 1 fell in the Intermediate category and no. 14 fell in the Hard for the 1st Grade English group.

In addition to classifying the sentences as Easy, Intermediate, and Hard on the basis of both versions of the test, we also ranked the sentences separately for version A and for version B (recall that version A contained one token of a given error type and version B contained a different token of that same error type). We found few differences in relative difficulty between the two tokens of each type of error in either the Spanish or the English test. The exceptions were errors no. 1 (A Intermediate, B Hard) and no. 8 (A Intermediate, B Easy) in Spanish, error no. 14 (A Easy, B Hard) in English, and error no. 15 (A Easy, B Hard) in both Spanish and English. It is worth noting that an error was typically noted in no. 8B on the Spanish test not because the children found the sentence ungrammatical but rather because they disagreed with its content – both the boys and girls felt that boys do not play with dolls.

Nine of the 15 types of ungrammatical constructions were included in both the Spanish and the English versions of the metalinguistic test. Seven of those 9 were found to occupy the same rank on both versions. Errors in word order (no. 2) and the article (no. 8) were Easy to note in both the Spanish and the English test. Errors in irregular verbs (no. 1), agreement between the coordinate noun and its verb (no. 5), the comparative (no. 6), and definite and indefinite pronoun agreement (no. 11) were Hard to note in Spanish and in English. Errors in selectional restrictions (no. 15) were Intermediate in both versions. The two discrepancies were the possessive marker (no. 9), which was Easy in Spanish but Intermediate in English (in Spanish the marker is an independent particle, whereas in English it is a bound morpheme), and adverb/verb agreement (no. 12), which was Hard in Spanish but Intermediate in English.

Table 8A presents the mean number of Easy, Intermediate, and Hard errors noted by the Spanish-speaking monolinguals in PK, K and 1st Grade; Table 8B presents comparable data for the English-speaking monolinguals. As suggested above, the ranking of item types in each language was the same for all of the age groups, i.e., the Easy items were easiest to note for all three groups, and the Hard items were hardest to note for all three groups. Indeed, the PKs noted very few Intermediate and Hard errors, achieving success primarily on the Easy errors. Moreover, in both languages, the children

Table 8. *Mean number of easy, intermediate, and hard errors noted by children in the three age groups*

A. Mean number of errors noted by the Spanish-speaking monolinguals (out of 10 in each category)

Type of error	PK	K	1st Grade
Easy	4.47	5.45	8.29
Intermediate	2.28	3.64	5.57
Hard	1.29	1.91	2.93

B. Mean number of errors noted by the English-speaking monolinguals (out of 10 in each category)

Type of error	PK	K	1st Grade
Easy	4.00	7.27	8.14
Intermediate	2.71	6.18	6.17
Hard	1.43	3.91	4.72

showed more improvement from PK to 1st Grade on the Easy constructions than on the Intermediate and Hard items. In fact, on some of the Hard items (e.g., item no. 11, definite and indefinite pronoun agreement), there was no improvement in either Spanish or English from PK to 1st Grade. Finally, differences between the two language groups were found primarily in the K children: the Spanish-speaking Ks noted fewer errors than the English-speaking Ks, a difference found in Easy items as well as Intermediate and Hard items.

Corrections

The relationship between noting and correcting errors

In addition to the proportions for noting errors, Table 7 also presents the proportion of grammar-oriented corrections (as opposed to content-oriented corrections) for each item on the Spanish (7A) and English (7B) test. The proportions are based on the number of errors noted for each item. Overall, the children gave grammar-oriented corrections for .82 of the errors they

noted on the Spanish test and for .94 of the errors they noted on the English test. Not only was the overall proportion of grammar-oriented corrections high, but there was also relatively little variability among the items. The proportion of grammar-oriented corrections ranged from .81 to 1.00 for the items on the English test and from .78 to .96 for the items on the Spanish test (with two outliers in Spanish, nos. 8 and 11). Thus, overall, if the children were able to note a grammatical error, they were able to correct that error in a grammatical fashion.

Developmental patterns in types of corrections

The mean proportions of each type of correction given by the Spanish-speaking monolingual children are presented in Table 9A. There was a significant increase in the proportion of grammar-oriented corrections ($F(2,29) = 5.89$, $p < .01$) and a significant decrease in the proportion of content-oriented

Table 9. *Types of corrections given by monolingual children*

A. Mean proportion of types of corrections given by Spanish-speaking monolinguals

Type of correction	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented	.50	(.16)	.79	(.08)	.89	(.02)
Content-oriented	.48	(.16)	.18	(.07)	.10	(.02)
No correction	.02	(.02)	.03	(.02)	.01	(.01)

Note: Proportions are based on the number of errors noted.

B. Mean proportion of types of corrections given by English-speaking monolinguals

Type of correction	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented	.66	(.13)	.91	(.03)	.98	(.01)
Content-oriented	.27	(.13)	.01	(.01)	.01	(.01)
No correction	.07	(.04)	.08	(.03)	.01	(.004)

Note: Proportions are based on the number of errors noted.

corrections ($F(2,29) = 5.62$, $p < .01$) between PK and 1st Grade. These changes occurred between PK and K (.05-level, Newman-Keuls test) rather than between K and 1st Grade. Thus, while the corrections of the PK children were half grammar-oriented and half content-oriented, the corrections of the K and 1st Grade children were already primarily grammar-oriented.

Table 9B presents the mean proportions of each type of correction produced by the English-speaking monolinguals. As for the Spanish-speaking children, there was also a significant increase in grammar-oriented corrections ($F(2,29) = 7.79$, $p < .01$) and a significant decrease in content-oriented corrections ($F(2,29) = 7.40$, $p < .01$) between the PK and 1st Grade English-speaking children. Here again, these changes occurred between PK and K (.05-level, Newman-Keuls test) rather than between K and 1st Grade. While the PK English-speaking children still made a number of content-oriented corrections, the K and 1st Grade children focused almost uniquely on grammatical issues in their corrections. Note that, at every age, the Spanish-speaking children produced more content-oriented corrections than the English-speaking children. This difference appeared to be item-related: a large proportion of the content-oriented corrections given by the Spanish-speaking children occurred on no. 8B, which (as noted above) appeared to be objectionable to the children because of their belief that boys are not supposed to play with dolls.

We noted above in Table 7 that, in general, if an error is detected, it tends to be given a grammar-oriented correction. Our developmental analyses indicate, however, that this pattern is a better description of the K and 1st Grade children than of the PK children who gave content-oriented corrections on some proportion of the errors they noted.

Effect of proficiency on type of correction

An analysis of covariance (with age as the covariate) indicated no effect of proficiency on type of correction for the Spanish-speaking group. An analysis of variance suggested a similar lack of effect for the English-speaking group. We were unable to perform an analysis of covariance on the English-speaking group as the slopes were unequal. However, an examination of the effect of proficiency on type of correction within each age group also suggested no main effect.

Developmental differences in grammar-oriented corrections

Although overall the children produced primarily grammar-oriented corrections for the errors they noted, there were differences in the particular grammar-oriented corrections given for the same error by the PK, K, and 1st Grade children. For example, the PK children often corrected no. 11 in both

Spanish and English by replacing the indefinite pronoun with a full noun (e.g., "I saw *a* pretty flower and you saw *a flower*," "Yesterday I met Susan and you met *Jonathan*"), while the K and 1st Grade children corrected no. 11 by using deletion (e.g., "I saw the pretty flower and so did you"). As another example, the PK children often corrected no. 1B in English (irregular verb) by replacing the incorrect "bringed" with the equally incorrect "brunged" or "brang," while the older children substituted the correct form "brought." Ungrammatical corrections were also given by PKs and Ks for no. 3B in English (e.g., replacing "colorfully" bird with "colorly" or "color" bird). 1st Grade children had no difficulty correcting errors of this type.

Similarly, the younger children tended to correct the incorrectly ordered constructions differently from the older children. For example, the PK children in both Spanish and English tended to correct no. 2B (word order) by omitting the pronoun ("The doctor is selling"), while 1st Grade children reversed the order of the pronoun and the verb ("The doctor is *selling it*"). As another example, the PK children tended to correct no. 15A (selection restriction) by replacing the inaminate subject with an animate one ("*I* play my older brother"), while the older children reversed the inanimate subject and the animate object ("*My older brother* plays *tennis*"). Interestingly, even the older children rarely reversed the constituents in no. 15B, that is, they shied away from reversing an animate subject with an inanimate object; instead, they tended to use the strategies used by the younger children and thus changed the verb ("Catherine *climbed* the big tree") or provided an animate object ("Catherine bothered her *big sister*").

In addition, for some of the ungrammatical constructions, there was variability in the grammar-oriented corrections given for a particular error even within an age group. For example, at all ages, no. 13 (reflexive pronoun) on the English test was corrected in one of three ways: by making the antecedent pronoun agree with the reflexive pronoun ("*He* washed himself this morning"), by deleting the reflexive pronoun ("You washed this morning"), or by substituting a non-reflexive pronoun for the reflexive pronoun ("you washed *him* this morning"); the first of these three corrections accounted for approximately 70% of the corrections on this error at each age. As another example, no. 9 (possessive marker) on the Spanish test tended to be corrected in one of two ways at all three age groups: by adding the possessive marker "de" ("El pastel *de* tu mami es rico" = "The cake of your mother is good"), or by omitting the second noun ("El pastel es rico" = "The cake is good"); these two types of corrections were equally frequent.

Finally, there were some ungrammatical constructions that were corrected in precisely the same ways at all ages. For example, the gender agreement errors on the Spanish test were always corrected by changing the article on

no. 3 ("*La* flor tiene muchos colores") and by changing the adjective on no. 4 ("El pescado es bien *bonito*"). Number agreement on the English test was always corrected by changing the singular subject and not the plural verb on no. 4 ("Many *doors* are completely broken") but by changing the singular verb and not the plural coordinate subject on no. 5 ("The fat cow and the horse *eat* a lot"). Adverb/verb agreement in Spanish and English was dictated by the word that came first, so that in no. 12A the verb was changed to match the preceding adverb ("Yesterday I *was* cutting the grass"), but in no. 12B the adverb was changed to match the preceding verb ("Richard danced very well *yesterday*"). In no. 10 on the Spanish test, the children always interpreted the first noun as the subject and the second noun as the object and marked the sentence accordingly ("Beatriz peinó *a* Maria"), despite the fact that, in principle, the meaning of these constructions is ambiguous.

Explanations

The relationship between noting and explaining errors

In addition to presenting the proportions for noting and correcting errors, Table 7 also displays the proportion of grammar-oriented explanations (and, in parentheses, the proportion of accurate rule-based explanations) for each item on the Spanish (7A) and English (7B) test. The proportions are based on the number of errors noted for each item. Unlike the proportions for grammatical corrections, which were quite high, the overall proportion of errors that were explained in a grammatical fashion, particularly in an accurate rule-based fashion, was much lower: overall, the children gave grammar-oriented explanations for .37 of the errors they noted on the Spanish test and for .59 of the errors they noted on the English test; moreover, they gave accurate rule-based explanations for only .27 of the errors they noted on the Spanish test and for .29 of the errors they noted on the English test. Thus, explaining grammatical errors appears to be a much more difficult task than either noting or correcting errors.

In addition, while the variability across items on the metalinguistic test was relatively small for grammatical corrections (cf. Table 7), it was large for grammatical explanations: the proportion of errors explained in a grammar-oriented fashion ranged from .00 to .81 (from .00 to .71 for accurate rule-based explanations) on the Spanish test and from .14 to .79 (from .00 to .70 for accurate rule-based explanations) on the English test. Moreover, the variability in grammatical explanations appeared to be unrelated to the ease or difficulty of noting an error. The data in Tables 7A and 7B suggest that errors that were Easy to note (top of the tables) were no more likely to be explained than errors that were Hard to note (bottom of the tables). On the Spanish

test, the children produced grammar-oriented explanations for .33 of the Easy errors, .44 of the Intermediate errors, and .32 of the Hard errors (and accurate rule-based explanations for .27, .27, and .26 of the errors, respectively). On the English test, the children produced grammar-oriented explanations for .55 of the Easy errors, .67 of the Intermediate errors, and .57 of the Hard errors (and accurate rule-based explanations for .20, .48, and .19 of the errors, respectively). Thus, errors that were easy to note were not necessarily easy to explain. These data suggest that the ability to detect a violation of a grammatical rule does not necessarily encompass the ability to explicitly articulate that rule. Moreover, a violation that is easily detected is no more likely to be explained in terms of the violated rule than is a violation that is detected with difficulty.

Developmental patterns in types of explanations

The mean proportions of each type of explanation produced by the Spanish-speaking children are presented in Table 10A. There was a signifi-

Table 10. *Types of explanations given by monolingual children*

A. Mean proportion of types of explanations given by Spanish-speaking monolinguals

Type of explanation	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented	.14	(.10)	.42	(.10)	.51	(.07)
Content-oriented	.39	(.18)	.24	(.12)	.04	(.02)
No explanation	.47	(.17)	.34	(.09)	.45	(.07)

Note: Proportions are based on the number of errors noted.

B. Mean proportion of types of explanations given by English-speaking monolinguals

Type of explanation	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented	.33	(.12)	.51	(.07)	.59	(.06)
Content-oriented	.50	(.14)	.08	(.03)	.03	(.01)
No explanation	.17	(.07)	.41	(.07)	.38	(.06)

Note: Proportions are based on the number of errors noted.

cant increase in grammar-oriented explanations ($F(2,29) = 3.69$, $p < .05$), with the primary change occurring between PK and K (.05-level, Newman-Keuls). Although the decrease in content-oriented explanations with age was not significant overall, a more sensitive trend analysis indicated a significant decrease in content-oriented explanations between PK and 1st Grade ($F_{reg}(1,29) = 5.47$, $p < .05$, res., n.s.). Most of the grammar-oriented explanations produced by the Spanish-speaking children were rule-based and only a small percentage were pinpointing (none for PK, 14% for K, 20% for 1st Grade). Moreover, the majority of the rule-based explanations the children produced were accurate (86% for PK, 83% for K, 93% for 1st Grade).

Table 10B presents the mean proportions of each type of explanation produced by the English-speaking children. There was a significant increase in grammar-oriented explanations ($F_{reg}(1,29) = 4.88$, $p < .05$) and a significant decrease in content-oriented explanations ($F_{reg}(1,29) = 32.54$, $p < .01$) between the PK and 1st Grade English-speaking children. These changes appeared to take place between PK and K (.05-level, Newman-Keuls, following a significant overall analysis of variance). In addition, the PK children produced a significantly smaller proportion of "no explanation" responses than the older children ($F_{reg}(1,29) = 4.34$, $p < .05$). As in the Spanish-speaking group, the majority of the grammar-oriented explanations produced by the English-speaking children were rule-based, although a sizeable proportion of pinpointing explanations remained (42% for PK, 31% for K, 39% for 1st Grade). As in the Spanish-speaking group, the majority of the rule-based explanations produced by the English-speaking children were accurate (68% for PK, 86% for K, 78% for 1st Grade).

For both Spanish-speakers and English-speakers, children between PK and K became better able to explain an error by giving grammar-oriented reasons. However, the language groups differed in two respects: (1) the Spanish-speaking Ks produced proportionately more content-oriented explanations than the English-speaking Ks, a difference consistent with the data in Tables 6 and 9, where the Spanish-speaking Ks were shown to be less likely to note errors and give grammatically appropriate corrections than the English-speaking Ks; (2) the Spanish-speaking PKs produced proportionately more no-explanation responses than the English-speaking PKs. In fact, the Spanish-speaking PKs seemed to follow the same response pattern that the older children in both groups followed; specifically, the children often gave a no-explanation response after they had given a grammar-oriented correction. In contrast, the English-speaking PKs often gave content-oriented explanations after they had given grammar-oriented corrections; thus, they appeared to prefer to switch orientation rather than give no explanation at all.

Effect of proficiency on type of explanation

Analyses of covariance (with age as the covariate) indicated that there were no effects of proficiency on the type of explanation produced by either the Spanish-speaking or the English-speaking children.

Developmental differences in the quality of grammar-oriented explanations

In Table 10 we saw that the significant increase in the children's ability to give grammar-oriented explanations occurred between PK and K. However, a detailed analysis of the particular grammar-oriented explanations given across the three age groups suggests that the kinds of information mentioned in a grammar-oriented explanation changed quite dramatically between K and 1st Grade, rather than between PK and K. We noted four different features that were common in the 1st Graders' grammar-oriented explanations but not in the PKs' and Ks' explanations.

Explicit mention of two linguistic elements. One of the most striking features found in a number of the 1st Graders' explanations was the explicit mention of more than one linguistic element in a construction and, in some cases, an attempt to relate those elements. For example:

(4A) *Many door are completely broken
Explanation: Because you have the word "many" there and "are" too; it doesn't go with "door."

(4B) *The shoe are very pretty
Explanation: "Are" is only used if you've got two or more shoes.

(5B) *Steven and Robert is a brother
Explanation: Because with "is" you can only talk about one brother and with "are" you're talking about two.

(12A) *Yesterday I am cutting the grass
Explanation: You've got the word "yesterday" and "I'm cutting the grass;" it should be "cut."

In contrast, the PK and K children typically mentioned only one linguistic element in their explanations, as in "because *shoe* means one" for no. 4B, or "because there's two" for no. 5B. Similarly, typical PK and K responses to no. 12A either referred explicitly to a single linguistic element (as in "because *I am cutting* means now") or simply suggested that the statement was inconsistent without mentioning any of the linguistic elements (as in "because it would be a different day").

Decontextualization of a linguistic element. The 1st Grade children were also able to explain an error by pointing out that a particular linguistic ele-

ment was inappropriate in that sentence and by providing a second context in which that element would be appropriate. For example:

(3B) *The colorfully bird sang loudly
Explanation: Not "colorfully;" you can say "does sing colorfully," but not "colorfully bird."

(10B) *Him eats a lot of candies and cookies
Explanation: "Him" doesn't sound right there; you could say, "why don't you play with him."

Although there were only a few such explanations in 1st Grade, there were none in PK and K. In many cases, the younger children (as well as many of the 1st Grade children) seemed unable to dissociate a word from its immediate structural context. Thus, a common response was to maintain that the inappropriately used word was simply not a word. For example, a number of children felt that "colorfully" in no. 3B and "him" in no. 10B were not words.

Identification of a morpheme and its function. The 1st Grade children produced a number of grammar-oriented explanations in which they identified the ungrammatical or missing morpheme and explicitly described the function of that morpheme. This type of explanation was not given by either PK or K children. For example:

(4B) *The shoe are very pretty
Explanation: There is more than one; you have to put an "s."

(7B) *William puts milks on his cereal
Explanation: 'Cause you have an "s" and you can only talk about one milk.

(9A) *The teacher coat is very dirty
Explanation: When it belongs to someone, you have to put "apostrophe s."

While it is quite possible that the ability to decontextualize or to focus on two elements and their relation simultaneously is related to more general problem-solving abilities, the ability to identify a morpheme and its function seems to be more domain specific, dependent on grammatical knowledge acquired perhaps through formal schooling.

Adult-like grammatical rules. A number of the grammar-oriented explanations offered by the 1st Grade children reflected an adult-like understanding of the grammatical rule in question. Such explanations, which also reflect growing grammatical knowledge, were infrequently found in PK or K children. For example:

(8A) *Dog licked the yellow plate
Explanation: Because you didn't say "the," and "dog" is not the name of the dog.
(8B) *Boy jumped over the wall
Explanation: If it's Tarzan you can say "Boy," otherwise not; you have to put "the."
(7B) *William puts milks on his cereal
Explanation: You can't say that because you can only put one part of it; you can't have two milks.
(9A) *The teacher coat is very dirty
Explanation: If it's the teacher's coat that means it belongs to her.

Item differences in types of explanations

Grammar-oriented explanations: Accurate rule-based. The overall proportion of errors explained by accurately invoking a grammatical rule was quite low. Nevertheless, some errors on the metalinguistic test were explained accurately much of the time (see Table 7). In particular, the children produced accurate rule-based explanations for over 50% of the errors they noted in selectional restrictions (no. 15 in Spanish and English), adverb/verb agreement (no. 12 in Spanish and English), gender agreement between the article and noun (no. 3 in Spanish) and between the adjective and noun (no. 4 in Spanish), and number agreement between the single noun and verb (no. 4 in English). Thus, the children appeared to have explicit (and accurate) knowledge of the rules underlying these particular grammatical constructions. Indeed, the accurate rule-based explanations produced by the PKs were primarily limited to these five constructions; PKs thus appeared to have explicit knowledge of a particularly restricted range of grammatical constructions.

In contrast, no PK children and very few K or 1st Grade children were able to give accurate rule-based explanations for the errors they noted in word order (no. 2 in Spanish and English), irregular verbs (no. 1 in Spanish and English), the object marker (nos. 7 and 10 in Spanish), case (no. 10 in English), the Spanish comparative (no. 6), and the Spanish possessive marker (no. 9). They produced accurate rule-based explanations for at most 9% of the errors they noted in these constructions. It is worth pointing out that grammatical devices such as word order, although among the first to be acquired by young language-learners, do not appear to be among the first to be accessible to conscious awareness in a metalinguistic task.

Of the 9 constructions that appeared on both the Spanish and English tests, 7 were equally easy (or hard) to explain in both languages (see Table 7). The proportions of accurate rule-based explanations were comparable in

the two languages on adverb/verb agreement (no. 12, .71 Spanish vs. .64 English), selectional restrictions (no. 15, .69 vs. .70), number agreement between a coordinate noun and verb (no. 5, .43 vs. .31), absence of the article (no. 8, .19 vs. .14), indefinite and definite pronoun agreement (no. 11, .17 vs. .23), irregular verbs (no. 1, .00 vs. .07), and word order (no. 2, .00 vs. .02). The two exceptions were the comparative (no. 7, .00 Spanish vs. .20 English) and the possessive marker (no. 9, .09 vs. .30), both of which were somewhat easier to explain in English than in Spanish. Thus, most of the grammatical constructions included in both the Spanish and the English tests were of equal explanatory difficulty in the two languages.

Grammar-oriented explanations: Misguided rule-based and pinpointing. When the children failed to give accurate rule-based explanations, they typically gave no explanation at all. However, the children did produce a number of either misguided rule-based or pinpointing explanations on selected items of the tests. For example, most of the rule-based explanations for errors in irregular verbs in Spanish and in English were misguided, e.g., no. 1A where the children thought that "eated" was wrong because there was only one child. Misguided explanations were also common in English for errors in case (e.g., no. 10A, "*Them* means a lot of people") and for errors in the adverb/adjective (e.g., no. 3B, "When you're talking about one you don't put *ly*," or "There is no such thing as *colorfully*"). Pinpointing explanations were common in English for errors in irregular verbs (no. 1), case (no. 10), and word order (no. 2, e.g., "The *it* is wrong"), but were quite rare in Spanish.

Content-oriented explanations. Although, on the whole, the children gave very few content-oriented explanations (PKs were the exception), these explanations were found to be relatively common for particular items: errors in the mass noun (no. 7) and the reflexive (no. 13) in English, and errors in the article (no. 8) in Spanish. Indeed, 30–40% of all content-oriented explanations across the three English-speaking age groups concerned construction no. 7A (e.g., "Because she can't drink so much at night"). Interestingly, most of the corrections for this error were grammar-oriented ("Catherine drinks water at night"), suggesting that the children were aware of the particular grammatical violation but were unable to explicitly articulate the rule underlying that violation. In contrast, the most common content-oriented explanations in Spanish, given in response to construction no. 8B (e.g., "Porque las niñas juegan con muñecas y los niños con carritos" = "Because girls play with dolls and boys with little cars"), typically followed content-oriented corrections (e.g., "Las niñas juegan con muñecas" = "Girls play with dolls"). The children appeared to focus solely on the content of this sentence in both their

corrections and their explanations, perhaps because they so strongly objected to its message.

Summary

We tested monolingual children, ages 4:5 to 8:0, learning either English or Spanish on three different metalinguistic tasks: noting, correcting, and explaining grammatical errors. We found that even the youngest children in our sample were able to note ungrammatical constructions in at least certain types of sentences. Moreover, we found that, particularly for the older children, if the children could detect a grammatical error, they were very likely to correct that error in a grammatically appropriate fashion. Thus, for the older children in our study, the tasks of noting and correcting errors in ungrammatical constructions appeared to tap similar metalinguistic skills.

In contrast, explaining the rule underlying a grammatical error appeared to be, for all children, a much more difficult task than either noting or correcting grammatical errors. Children who were able to detect a grammatical error were not necessarily able to explain that error. Moreover, errors that were hard to detect were no more difficult to explain than errors that were easy to detect. These data suggest that explaining grammatical errors appears to be a qualitatively different metalinguistic task from either noting or correcting grammatical errors.

In terms of developmental changes in metalinguistic abilities, we found the biggest differences in performance between PK and K. In both Spanish and English, the PK children were able to detect errors in only a limited set of grammatical constructions. Moreover, the PK children corrected and explained the errors they noted in a content-oriented fashion relatively often. Finally, the PK children were able to provide accurate rule-based explanations for only a very few types of errors. By kindergarten, the children had increased the number of errors they could detect and had begun providing exclusively grammar-oriented corrections and explanations for those errors. In addition, the kindergarten children had begun to extend the range of error types they could explain in an accurate rule-based fashion, and the 1st Grade children had begun to express those explanations in a manner that was relatively sophisticated from both a cognitive and a linguistic point of view.

In the next section, we consider the hypothesis that bilingual children, as a result of their in-depth experience with two distinct language systems, might follow a different developmental path with respect to metalinguistic knowledge than monolingual children. We ask, in particular, whether bilingual children differ from monolingual children at any of the three ages (PK, K, and 1st Grade) and with respect to any of the three metalinguistic tasks

(noting, correcting, and explaining grammatical errors) that we have examined.

The effect of the bilingual experience on the development of metalinguistic skills

Errors noted

Bilingual versus monolingual comparisons

Recall that the bilingual children were given only one version of the metalinguistic task in each language (i.e., 15 ungrammatical constructions in Spanish, and 15 in English), while the monolingual children were given both versions of the task in the appropriate language (i.e., a total of 30 ungrammatical constructions in one language). In order that the comparison between the bilingual and monolingual children be based on the same number of ungrammatical constructions in each language, we considered only one of the versions of the metalinguistic task taken by the monolingual children in our analyses. Thus, the bilingual versus monolingual comparison was based on a total of 15 ungrammatical constructions for Spanish, and 15 for English. The particular version included in the analyses for each monolingual child was chosen at random, while still assuring that there were an equal number of bilingual and monolingual children per version (this precaution was taken despite the fact that, as mentioned previously, the versions were not found to be significantly different in either language).

Table 11A presents the mean number of errors (out of 15) noted in Spanish by the bilinguals, compared to the mean number of errors (also out of 15) noted by the Spanish-speaking monolinguals. The bilingual children noted 53% of the errors in PK, 60% in K, and 67% in 1st Grade. In contrast, the monolingual children noted only 25% of the errors in PK, 35% in K, and 55% in 1st Grade. At each age, the bilingual children noted a significantly greater number of errors in Spanish than the monolingual children (Fs(1,58) ranging from 4.67 to 8.16, ps $< .05$ in a priori contrasts performed following a significant one-way analysis of variance, $F(5,58) = 7.07$, $p < .0001$).

The number of errors reported in the fillers was examined as a base-line for each of the groups of children. The bilinguals in Spanish (incorrectly) reported errors in 6% of the fillers in PK, 7% in K, and 3% in 1st Grade. Similarly, the Spanish-speaking monolinguals reported errors in 9% of the fillers in PK, 4% in K, and 1% in 1st Grade. Thus, relatively few of the fillers were reported to be ungrammatical at all ages, suggesting that the high percentage of errors noted in the ungrammatical constructions was not attributable to a response bias.

Table 11. *Mean number of errors noted by bilingual and monolingual children*

A. Mean number of errors noted in Spanish by bilingual children and Spanish-speaking monolingual children

Language group	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Bilinguals	8.00	(1.16)	9.00	(.99)	10.79	(.59)
Monolinguals	3.71	(1.38)	5.27	(1.10)	8.29	(.76)

Note: The number of errors noted is based on a possible 15.

B. Mean number of errors noted in English by bilingual children and English-speaking monolingual children

Language group	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Unadjusted for proficiency:						
Bilinguals	4.29	(.68)	7.00	(.94)	9.57	(.48)
Monolinguals	3.57	(.84)	8.27	(.95)	9.21	(.94)
Adjusted for proficiency:						
Bilinguals	4.51	(.88)	8.28	(.99)	9.88	(.73)
Monolinguals	3.35	(.88)	6.99	(.99)	8.91	(.73)

Note: The number of errors noted is based on a possible 15.

We found a significant linear trend in the number of errors noted in the ungrammatical constructions between PK and 1st Grade for both the bilinguals in Spanish ($F_{reg}(1,29) = 4.64$, $p < .05$, res., n.s.) and the Spanish-speaking monolinguals ($F_{reg}(1,29) = 8.94$, $p < .01$, res., n.s.). A two-way analysis of variance indicated no significant interaction between age group and language group ($F(2,58) = .47$, n.s.), suggesting a similar developmental pattern during the period between PK and 1st Grade for bilinguals and monolinguals.

Table 11B presents the mean number of errors (out of 15) noted in English by the bilinguals, compared to the mean number of errors (out of 15) noted by the English-speaking monolinguals. Considering the means unadjusted for proficiency, the bilinguals noted 29% of the errors in PK, 47% in K, and 64% in 1st Grade. The monolinguals noted 24% of the errors in PK, 55% in K, and 62% in 1st Grade. The differences in number of errors noted between

bilinguals and monolinguals were not significant at any age, using a priori contrasts following a significant one-way analysis of variance ($F(5,58) = 7.50$, $p < .0001$).

The bilinguals in English reported errors in 2% of the fillers in PK, 9% in K, and 5% in the 1st Grade. The English-speaking monolinguals reported errors in 8% of the fillers in PK, 6% in K, and 2% in 1st Grade.

There was a significant increase in number of errors noted in the ungrammatical constructions with age for both the bilinguals in English ($F(2,29) = 12.33$, $p < .0001$) and the English-speaking monolinguals ($F(2,29) = 7.74$, $p < .01$). Moreover, for both bilinguals and monolinguals, the developmental change appeared to take place between PK and K (.05-level, Newman-Keuls).

The effect of proficiency on errors noted

Proficiency was found to have an effect on the number of errors noted (using analyses of covariance with age as the covariate), but only in the groups which had sufficient variation in proficiency within the population. Proficiency affected the number of errors noted in the English-speaking monolinguals, where a third of the children were highly proficient and the rest fully proficient ($F_{cov}(1,29) = 6.32$, $p < .05$), and in the bilinguals tested in English, where there was even greater variation in proficiency ($F_{cov}(3,27) = 4.32$, $p < .05$). In contrast, proficiency was found to have no effect on number of errors noted in either the Spanish-speaking monolinguals or the bilinguals tested in Spanish, most of whom were fully proficient in Spanish.

Controlling for proficiency

To summarize thus far, we have found that the bilinguals performed better than the monolinguals on the metalinguistic noting task in Spanish but not in English. Recall, however, that while the bilinguals were at the same (high) proficiency level in Spanish as the Spanish-speaking monolinguals, the bilinguals were *less* proficient in English than the English-speaking monolinguals. For example, in the K groups, 73% of the 11 monolinguals were fully proficient in English, compared to only 18% of the 11 bilinguals. None of the monolingual Ks was at the low-intermediate or intermediate proficiency level in English, compared to 45% of the 11 bilingual Ks. Note, however, that despite this difference in proficiency, the bilinguals performed as well as the monolinguals in noting grammatical errors on the metalinguistic task. Indeed, if we adjust the mean number of errors noted for proficiency,[8] we find that

[8]After determining that the regression coefficients did not differ significantly within the different age groups, we adjusted the mean number of errors for proficiency by performing an analysis of covariance within each of the age groups, using the raw English proficiency score as the covariate.

the bilingual children noted more errors than the monolingual children at every age (see Table 11B), although the differences do not reach significance. These data suggest that a child who is bilingual will be able to detect more grammatical errors than he would be expected to detect on the basis of his proficiency in the language alone.

Effect of balance on errors noted

We found no significant effects of balance (controlling for proficiency and using age as the covariate) on the number of errors noted in the bilingual group tested in either Spanish or English. For example, the children who were fully proficient in Spanish and balanced (i.e., fully proficient in English as well) did not note significantly more errors in Spanish than the children who were fully proficient in Spanish and unbalanced (i.e., intermediate or low-intermediate in English) ($F_{cov}(2,15) = 1.71$, n.s.). It is important to note, however, that the proficiency range was restricted in our study and, thus, so was the range for balance.

Types of errors noted

To determine whether the bilingual and monolingual children differed in the types of errors they found easy to note, we used the rankings established for English and for Spanish in our original analysis of the monolingual samples (see Table 7) and calculated the proportion of errors noted for each of these rankings. Table 12A presents the mean number of Easy, Intermediate, and Hard errors noted by the bilinguals in Spanish and by the Spanish-speaking monolinguals in PK, K and 1st Grade. Table 12B presents comparable data for the bilinguals in English and the English-speaking monolinguals. Note that the ranking of item types in each language was the same for all of the age groups and for both bilinguals and monolinguals, that is, the Easy items were easiest to note and the Hard items were hardest to note for bilinguals and monolinguals in all three age groups, with the exception that for the bilingual Ks and 1st Graders in Spanish the Hard items were not substantially more difficult to note than the Intermediate items.

In Spanish, at every age, the bilinguals noted a greater mean number of errors than the monolinguals for Easy, Intermediate, and Hard items (except in 1st Grade for the Easy items, where both groups performed close to ceiling). The bilingual advantage was particularly striking, however, in the youngest children: The monolingual PKs noted, for the most part, only Easy items, while the bilingual PKs noted items at all three levels of difficulty.

In English, at every age, the bilinguals noted approximately the same mean number of errors as the monolinguals for Easy, Intermediate, and Hard items. This lack of difference between the bilinguals and monolinguals

Table 12. *Mean number of easy, intermediate, and hard errors noted by bilingual children and monolingual children*

A. Mean number of errors noted in Spanish by bilinguals and Spanish-speaking monolinguals (out of 5 in each category)

Type of error	PK	K	1st Grade
Easy:			
Bilinguals	3.57	4.09	4.43
Monolinguals	2.43	2.36	4.15
Intermediate:			
Bilinguals	2.72	2.73	3.29
Monolinguals	.85	2.00	2.64
Hard:			
Bilinguals	1.71	2.18	3.07
Monolinguals	.43	.91	1.50

B. Mean number of errors noted in English by bilinguals and English-speaking monolinguals (out of 5 in each category)

Type of error	PK	K	1st Grade
Easy:			
Bilinguals	2.57	3.00	4.57
Monolinguals	1.86	3.63	4.14
Intermediate:			
Bilinguals	1.00	2.45	3.29
Monolinguals	1.14	2.73	3.00
Hard:			
Bilinguals	.72	1.55	1.71
Monolinguals	.57	1.91	2.07

occurred despite the fact that the bilinguals were far less proficient in English than were the English-speaking monolinguals.

Corrections

Bilingual versus monolingual comparisons

Table 13A presents the mean proportion of types of corrections produced by the bilinguals tested in Spanish compared to the Spanish-speaking

Table 13. *Types of corrections given by bilingual and monolingual children*

A. Mean proportion of types of corrections given in Spanish by bilingual children and Spanish-speaking monolinguals

Type of correction	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented:						
Bilinguals	.84	(.07)	.88	(.06)	.91	(.02)
Monolinguals	.45	(.21)	.83	(.06)	.90	(.03)
Content-oriented:						
Bilinguals	.09	(.05)	.12	(.06)	.06	(.02)
Monolinguals	.55	(.21)	.11	(.05)	.09	(.03)
No correction:						
Bilinguals	.07	(.06)	.00	(.00)	.03	(.02)
Monolinguals	.00	(.00)	.06	(.05)	.01	(.01)

Note: Proportions are based on the number of errors noted.

B. Mean proportion of types of corrections given in English by bilingual children and English-speaking monolinguals

Type ot correction	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented:						
Bilinguals	.83	(.10)	.92	(.05)	.98	(.01)
Monolinguals	.65	(.15)	.88	(.05)	.98	(.01)
Content-oriented:						
Bilinguals	.02	(.02)	.05	(.05)	.01	(.01)
Monolinguals	.25	(.16)	.02	(.01)	.01	(.01)
No correction:						
Bilinguals	.15	(.01)	.03	(.02)	.01	(.01)
Monolinguals	.10	(.08)	.10	(.03)	.01	(.01)

Note: Proportions are based on the number of errors noted.

monolinguals. Table 13B presents comparable data for the bilinguals tested in English compared to the English-speaking monolinguals. Note that the bilingual and monolingual children did not differ in K and 1st Grade in either Spanish or English. Independent of whether they were bilingual or monolin-

gual, the older children tended to produce grammar-oriented corrections rather than content-oriented corrections.

In contrast, the bilingual and monolingual children did differ in PK in both Spanish and English. In particular, the PK bilinguals produced proportionately more grammar-oriented corrections than the PK monolinguals both in Spanish ($F(1,57) = 10.98, p < .01$) and in English ($F(1,57) = 3.44, p < .07$). This bilingual advantage was found for all errors, independent of whether they were Easy, Intermediate, or Hard to note. Thus, by age 5, the bilingual children appeared to have already assumed a form-oriented approach to correcting errors.

The PK bilinguals were also found to differ from the PK monolinguals with respect to content-oriented corrections: the PK bilinguals produced proportionately fewer content-oriented corrections than the PK monolinguals in both Spanish ($F(1,57) = 17.21, p < .0001$) and English ($F(1,57) = 8.80, p < .01$). Thus, unlike the PK bilinguals, the PK monolinguals appeared to retain a message-oriented approach to corrections rather than focus exclusively on form.

Effect of proficiency and balance on type of correction

We found no significant effects of proficiency on the types of corrections produced in any of the language cohorts (using analyses of variance or, when appropriate, analyses of covariance with age as the covariate). For example, the bilingual children who were highly or fully proficient in English produced no more grammar-oriented corrections in English than the bilingual children who were at a low-intermediate or intermediate level of proficiency in English.

We also found no significant effects of balance (controlling for proficiency level) on the types of corrections produced by the bilingual children in either Spanish or English. For example, the bilinguals who were fully proficient in Spanish and balanced (i.e., fully proficient in English as well) produced no more grammar-oriented corrections in Spanish than the bilinguals who were fully proficient in Spanish and unbalanced (i.e., low-intermediate or intermediate proficiency in English).

Explanations

Bilingual versus monolingual comparisons

Table 14A presents the mean proportion of types of explanations produced by the bilinguals tested in Spanish compared to the Spanish-speaking monolinguals. Table 14B presents comparable data for the bilinguals tested in English compared to the English-speaking monolinguals. As in the analysis

Table 14. *Types of explanations given by bilingual and monolingual children*

A. Mean proportion of types of explanations given in Spanish by bilingual children and Spanish-speaking monolinguals

Type of explanation	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented:						
Bilinguals	.47	(.13)	.51	(.06)	.63	(.08)
Monolinguals	.20	(.12)	.41	(.12)	.48	(.07)
Content-oriented:						
Bilinguals	.00	(.00)	.15	(.09)	.07	(.04)
Monolinguals	.57	(.23)	.23	(.12)	.04	(.02)
No explanation:						
Bilinguals	.53	(.13)	.34	(.06)	.30	(.08)
Monolinguals	.23	(.11)	.36	(.11)	.48	(.06)

Note: Proportions are based on the number of errors noted.

B. Mean proportion of types of explanations given in English by bilingual children and English-speaking monolinguals

Type of explanation	PK		K		1st Grade	
	Mean	SE	Mean	SE	Mean	SE
Grammar-oriented:						
Bilinguals	.39	(.16)	.44	(.10)	.66	(.06)
Monolinguals	.49	(.12)	.53	(.10)	.60	(.07)
Content-oriented:						
Bilinguals	.00	(.00)	.02	(.02)	.09	(.03)
Monolinguals	.31	(.12)	.07	(.05)	.02	(.01)
No explanation:						
Bilinguals	.61	(.16)	.54	(.10)	.25	(.06)
Monolinguals	.20	(.09)	.40	(.10)	.38	(.07)

Note: Proportions are based on the number of errors noted.

of types of corrections, the bilinguals and the monolinguals were not found to differ in K and 1st Grade in either Spanish or English. Both the bilingual and the monolingual K and 1st Grade children produced grammar-oriented explanations about half of the time and produced content-oriented explanations only infrequently.

Recall that, at the youngest age group (i.e., the PKs), the bilingual children were found to have an advantage over the monolingual children in producing grammar-oriented corrections (Table 13). Interestingly, however, no such advantage was found for the bilingual PKs with respect to grammar-oriented explanations. As Table 14 shows, the PK bilinguals did *not* differ significantly from the PK monolinguals in the proportion of grammar-oriented explanations they produced in either Spanish ($F(1,55) = 2.52$, $p = 12$) or English ($F(1,57 = .39$, n.s.). Thus, although the PK bilinguals appeared to be precocious at correcting grammatical errors, they were no more adept at explaining those errors than young children with monolingual experiences.

The PK bilinguals did differ from the monolinguals, however, with respect to content-oriented explanations and no-explanation responses. The PK bilinguals produced proportionately fewer content-oriented explanations than the PK monolinguals in Spanish ($F(1,55) = 12.86$, $p < .001$) and in English ($F(1,57) = 22.22$, $p < .0001$), and proportionately more no-explanation responses than the PK monolinguals in Spanish ($F(1,55) = 2.90$, $p < .10$) and in English ($F(1,57) = 6.36$, $p < .05$). Thus, the bilingual PKs behaved like the older bilingual and monolingual children with respect to content-oriented explanations: if the children could not provide a grammar-oriented explanation for an error, they gave no response rather than give a content-oriented explanation. These data suggest that, while the bilingual experience may not confer an advantage upon a child in terms of grammar-oriented explanations, at the very least the experience appears to discourage a content-oriented approach to explanation.

In a more detailed analysis of grammar-oriented explanations, we found that the bilinguals also resembled the monolinguals in terms of the types of errors they explained and the quality of the explanations they gave for those errors. The bilinguals were found to give accurate rule-based explanations for precisely the same types of errors as the monolingual children (see "Item differences in types of explanations"). In particular, the PK bilinguals basically restricted their accurate rule-based explanations to the same five types of errors that the monolinguals were found to explain well (i.e., selectional restrictions, adverb/verb agreement, gender agreement between noun and article, gender agreement between noun and adjective, and number agreement). Moreover, very few of the bilingual children gave accurate rule-based explanations for the types of errors that were difficult for the monolinguals

to explain (i.e., object marker, irregular verb, word order, case, Spanish comparative marker, and Spanish possessive marker, although the object marker was somewhat easier to explain for the bilinguals than the monolinguals in Spanish).[9] In addition, at each age, the bilinguals were found to use explanations of the same quality as the monolinguals (see "Developmental differences in the quality of grammar-oriented explanations"). In particular, the bilinguals in PK and K were rarely found to use any of the more sophisticated grammatical explanations that were found in the 1st Grade children's responses (i.e., explicit mention of two linguistic units, decontextualization of a linguistic element, identification of a morpheme and its function, and adult-like grammatical rules). As in the monolingual population, the shift toward these more advanced explanations occurred in the bilinguals between K and 1st Grade.

Effect of proficiency and balance on type of explanation

We found no significant effects of proficiency on type of explanation in any of the groups (using analyses of covariance with age as the covariate). Moreover, we found no significant effects of balance (controlling for proficiency) on type of explanation for the bilinguals tested in either Spanish or English.

Summary

In this section, we have examined the role that the bilingual experience might play in fostering metalinguistic awareness. The bilingual speaker has experience with two different formal linguistic systems and, as a result, may come to recognize and appreciate linguistic form earlier in development than the monolingual speaker. We tested this hypothesis with respect to three distinct metalinguistic tasks, noting, correcting and explaining grammatical errors.

We found that the bilinguals noted more grammatical errors than the monolinguals in Spanish where they were equally proficient, and the same number of errors as the monolinguals in English where the bilinguals were far less proficient. Moreover, in both Spanish and English, the PK bilinguals produced more grammar-oriented corrections for the errors they noted than the monolinguals, whose corrections were still relatively content-oriented at this stage. Thus, the bilinguals appeared to have an advantage over the monolinguals with respect to noting and correcting errors.

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[9]There were, however, five errors in English that the bilinguals rarely explained accurately but that the monolinguals explained accurately about a third of the time, that is, the possessive marker, the preposition, number agreement between a coordinate subject and verb, adverb/adjective derivation, and the comparative.

However, the PK bilinguals did *not*, for the most part, maintain this advantage in the third metalinguistic task, explanations. Although the bilinguals produced fewer content-oriented explanations in pre-kindergarten, they produced no more grammar-oriented explanations than did the monolinguals at any of the three ages. Thus, the bilingual experience appeared to influence performance on the noting and correcting tasks but not on the explanation task.

Discussion

The acquisition of levels of metalinguistic awareness in monolingual children

Development from content-based to form-based approaches to language at each level of awareness. Our tests of metalinguistic knowledge were designed to determine whether children are aware of violations in the forms (and not the meanings) of the sentences in their language. Three different levels of awareness were tapped: the ability to detect a grammatical error in a sentence, the ability to correct that error, and the ability to explain why that error was wrong.

We found that the youngest children in our sample (the PK group, aged 4½) were able to detect errors in ungrammatical constructions and thus could attend to the form of a sentence independent of its meaning. Children younger than those tested in our sample have been found to detect errors in ungrammatical constructions, but only if those errors appear in constructions which are semantically unclear. For example, de Villiers and de Villiers (1972) found that 3-year-old children could note an error of form in a sentence if it were semantically anomalous (e.g., the child could recognize that "teeth your brush" is not a good sentence). Thus, the literature and our data taken together suggest that the child's approach to *detecting* errors in ungrammatical constructions is initially meaning- or content-based and only later form-based.

We found a similar developmental pattern, that is, development from a content-based to a form-based approach to language, in the *corrections* the children in our study produced. The younger PK children gave corrections which were often content-oriented, while the older K and 1st Grade children gave corrections which were almost exclusively grammar-oriented.[10] Moreover, we found further developmental differences in the types of grammar-oriented corrections the younger and older children gave, suggesting an additional developmental step within form-based corrections. The younger children tended to give grammar-oriented corrections based on an awareness

of isolated linguistic markers, while the older children gave grammar-oriented corrections based on an awareness of a more complete linguistic system. For example, the PK children tended to alter an isolated component of the sentence in their form-based corrections, while the older K and 1st Grade children tended to unify the sentence in their corrections (e.g., to correct the sentence "Yesterday I met Susan and you met one," the younger PK children produced "Yesterday I met Susan and you met Jonathan," a local rather than a global correction; in contrast, the older children produced "Yesterday I met Susan and so did you," a correction that involves and unifies both clauses of the sentence). Similarly, the younger children's corrections of word-order violations tended to use only a subset of the words in the sentence, while the older children's corrections used all of the words, reordering them into a unified whole (e.g., to correct "The doctor is it selling," the younger children produced "The doctor is selling," while the older children produced "The doctor is selling it"). Thus, we found a progression in the children's corrections from an orientation to language based on content, to an orientation based on linguistic markers, to an orientation based on linguistic systems.

In general, *explaining* grammatical errors was a much more difficult task than either noting or correcting grammatical errors. Nevertheless, we found the same basic pattern of development in the children's explanations as was found in the children's corrections and detections. The PK children gave primarily content-oriented explanations, while the K and 1st Grade children both gave more grammar-oriented than content-oriented explanations. In addition, the 1st Grade children – but not the K and PK children – produced a variety of different types of grammar-oriented explanations reflecting sensitivity to a linguistic system. In particular, the 1st Grade children showed an awareness of the linguistic system underlying the constructions they were explaining by explicitly mentioning two linguistic elements in a sentence, decontextualizing linguistic elements, identifying morphemes and their functions in the system, and providing adult-like grammatical rules.

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[10]Note that, while the PK children failed to produce form-based corrections, they were able to detect errors that were form-based. What type of mechanism could account for this pattern in the PK children? The unconscious error-detection monitor suggested by Karmiloff-Smith (1986) and Marshall and Morton (1978) to account for repairs in one's own speech could also account for the young child's ability to detect errors in the speech of others, as well as his inability to correct those errors in a form-based way. A monitor of this sort would presumably enable the young child to process information at a relatively shallow level, allowing extraction of the meaning (cf. Mistler-Lachmann, 1972) but not the structural form of a sentence. Thus, the young child might be able to realize that a sentence is not a "good" one on the basis of form, but be left only with information about the meaning of the sentence on which to base his correction. In contrast, the older child, who can correct the form of an error in addition to noting it, is able to process a sentence exhaustively, retaining structural information in short-term memory long enough to generate a correct sentence associated with the incorrect form (Fowler, 1988).

In sum, our data suggest that there is a sequence of development in the children's awareness of language from an orientation to language based on content, to an orientation based on linguistic markers, to an orientation based on linguistic systems – a sequence that first appears in detections and corrections and later in explanations.

These data support the observations of Karmiloff-Smith (1986) who found a developmental progression from sensitivity to extralinguistic cues, to sensitivity to intralinguistic cues based on markers, to sensitivity to intralinguistic cues based on systems. Karmiloff-Smith found this sequence first in children's repairs of their own speech, and later in children's metalinguistic explanations. Thus, at any given moment in development, a child cannot be categorized by a single approach to language – either content-based or form-based. The nature of the child's approach to language depends on the level of linguistic awareness being tapped, and on the progress the child has made in that level's transition from a content-based to a form-based approach.

Although there were differences across all three age groups in the children's performances on the detection, correction, and explanation tasks, the largest differences tended to occur between the PK and K children rather than between the K and 1st Grade children. Most of the K children had entered a formal school environment for the first time in the fall of the year we tested them – an environment where they were likely to be exposed to tasks that promote attention to language. These results suggest that formal schooling may itself be one of the types of experiences that promote metalinguistic development. However, it is possible that the decision to begin schooling at age 5 or 6 is rooted, at least in part, in the average 5–6-year-old's "readiness" to master language-based tasks, where "readiness" may be measured in terms of language skills in general and metalinguistic skills in particular. Our data do not allow us to determine whether schooling heightens metalinguistic awareness, or whether an increase in metalinguistic awareness makes schooling possible. We suspect that both hypotheses may have merit. Our data do suggest, however, that an increase in metalinguistic abilities is associated with the onset of formal schooling.

Types of grammatical constructions mastered at each level of awareness. We now turn to the types of grammatical constructions that are mastered at each of the three levels of awareness we have investigated. One might expect that the same grammatical constructions would be easy or difficult to master across all three levels of awareness, that is, constructions which were easy to detect would be easily corrected and explained. However, our results show that this is not the case.

We found that, for the most part, once the children were able to *detect* an

error of form, they were able to *correct* that same error in a grammatical fashion. However, the errors that the children found easy to detect and correct were not necessarily the errors they found easy to *explain*, and vice versa. For example, in both Spanish and English, violations in word order ("The doctor is it selling") were among the easiest errors to detect, yet these errors were among the hardest to explain in an accurate rule-based fashion. Conversely, violations in adverb/verb agreement in Spanish ("Comí muchos dulces mañana" = I ate many candies tomorrow") were among the most difficult errors to detect, but if detected they were explained accurately 71% of the time.

The existence of differences in the types of constructions that were easily detected and corrected versus constructions that were easily explained suggests that the skills necessary to perform these tasks may be governed by different principles of acquisition. With respect to detections and corrections, we found that the children were easily able to detect and correct errors in word order and in nominal categories – articles, gender, and number.[11] These particular errors – which have been found to be easy to detect in other studies of metalinguistic awareness in Spanish (Galambos & Hakuta, 1988) and in English (Gleitman et al., 1972)[12] – involve grammatical constructions that are among the first to be acquired by early language-learners. Word order is one of the earliest grammatical devices to appear in the speech of young children learning a variety of languages (Brown, 1973; Gleitman & Wanner, 1982). Similarly, nominal categories such as gender distinctions in Spanish (Fantini, 1976) and articles and plural inflections, that is, number, in English (Brown, 1973) have been found to be among the first constructions acquired by young speakers.

It is possible that the same factors that lead to the early acquisition of these linguistic constructions (e.g., a predisposition to attend to the order of elements and/or to stressed elements, cf. Gleitman & Wanner, 1982; or an inclination to acquire, and therefore attend to, words for objects, cf. Clark, 1982) also lead to the relative ease of detecting and correcting errors in these

[11]Although errors in number agreement between a single subject and verb (no. 4 in English) were easy to detect, errors in number agreement between a coordinate subject and verb (no. 5) were more difficult to detect. It is interesting to note that when the children corrected error no. 4 (the single subject), they tended to alter the noun and not the verb (e.g., "Many doors are completely broken,"); however, when they corrected error no. 5 (the coordinate subject), they altered the verb (e.g., "The fat cow and the horse *eat* a lot"). Thus, the children appeared to treat no. 4 (the error that was easy to detect) as a problem in noun-marking, while they treated no. 5 (the more difficult error) as a problem in verb-marking.

[12]Gleitman et al.'s (1972) results differed slightly from ours in that their 5-year-old subjects found errors involving agreement between a pronoun and a common noun (no. 11A) harder to note than errors involving agreement between a pronoun and a proper noun (no. 11B). In our study, these two types of errors were equally difficult to detect.

constructions. However, an alternative hypothesis is that errors are easy to detect and correct in constructions acquired at a very young age simply because the child has had a great deal of practice attending to and generating these early-acquired constructions. Practice ought to lead to the development of automatized procedures for processing the form of early-acquired grammatical constructions, and these procedures – by increasing the attentional resources available to encode the form of a well-practiced construction (Anderson, 1982; Shiffrin & Schneider, 1977; Sternberg, 1984) – would presumably make errors in the early-acquired constructions relatively easy to detect.

In contrast, practice (or ease of acquisition) does not appear to be a central factor governing the ease or difficulty of explaining a grammatical construction. Rather, the explicitness of a linguistic marker and its role as a local cue in the sentence appear to play important roles in determining which errors were easy to explain. In many of the more easily explained errors, the forms provided an explicit mismatch between grammatical markings on two words within a larger grammatical unit (e.g., gender agreement between the noun and adjective, gender agreement between the noun and article, temporal agreement between the verb and adverb). Thus, the children found it easiest to explain errors which violated local and explicit cues to organization. (Interestingly, the explicitness of a linguistic marker did not appear to be as important in determining how easy an error was to detect.) In contrast, the children found it more difficult to explain errors involving the entire construction (e.g., word order) or morphemes whose roles were defined by the entire construction (e.g., object marker, case, comparative), that is, errors which were not signaled by a mismatch of local cues but by the relationship among the words in the sentence.

In sum, the same transition from a content-based to a form-based approach to language appears to characterize the developmental path a child follows at each level of awareness; that is, the child follows the same path in acquiring the ability to detect, to correct, and to explain grammatical errors. However, that path appears to lead to *different* outcomes at each of those levels of awareness in terms of the types of grammatical constructions that are easy to master – the constructions that are easy to detect and correct are distinct from those that are easy to explain.

The effect of learning two languages on a child's awareness of language

What effect does the experience of learning two languages have on the progression from content-based to form-based approaches to language, and on the types of grammatical constructions that are mastered during each of these transitions? We found that the experience of learning two languages affected the bilingual's metalinguistic performance relative to the monoling-

ual's primarily for noting and correcting grammatical errors, and much less so for explaining those errors. In particular, we found that the bilinguals were able to detect more grammatical errors than monolinguals of the same age when the two groups of children were equated for their proficiency in the language. Moreover, the bilinguals adopted a primarily grammar-oriented approach to corrections by pre-kindergarten while the monolinguals' corrections were not primarily grammar-oriented until kindergarten. In contrast, the bilinguals were no more likely than the monolinguals to give grammar-oriented explanations at any age (even PK). At best, the bilingual experience appeared to discourage content-oriented explanations in bilinguals while not affecting their grammar-oriented explanations at all. Thus, the bilingual experience appeared to facilitate progress through the developmentally early transitions (i.e., transitions at the levels of detection and correction) but had only a minimal effect on the child's progress through the later transition at the level of explanation.

It is possible that we have observed the bilingual children too early to observe an effect of learning two languages on the ability to produce metalinguistic explanations, and that we would find a more powerful effect of the bilingual experience on explanations if we were to observe older children. However, it is important to note that both the monolingual and bilingual children in our study had already begun the shift from content-oriented to grammar-oriented explanations, and the older children in both groups had begun to produce grammar-oriented explanations that showed sensitivity to a linguistic system. Extrapolating from our results on corrections, we would have expected the beneficial effect of bilingualism to be evident before this shift to grammar-oriented explanations.

We also found that the experience of learning two languages did *not* have an effect on the types of violations the children found easy or difficult to master at any of the three levels of awareness. There were no qualitative differences in the types of constructions that the bilingual and monolingual children were able to note, correct, or explain, and no qualitative differences in the types of grammar-oriented corrections and explanations produced by the two groups of children. Thus, although the bilingual experience appears to hasten a child's progress away from a content-based approach to language at all three levels of awareness (detection, correction, and explanation), it does not appear to alter what the child knows about language at any of the three levels.

Why might this be so? By the age of 4½, bilingual children have differentiated the two language systems they are learning and, in so doing, have developed automatized procedures for attending to the forms of their languages. The process of automatizing a procedure permits conscious access to

that procedure in a wide range of environments (Anderson, 1982; Shiffrin & Schneider, 1977; Sternberg, 1984). Thus, the automatization of the procedures bilingual children develop to differentiate their two languages could account for the children's heightened attention to the form of language (as opposed to its meaning) in metalinguistic tasks. But note that, while the younger bilingual children in our study produced fewer content-oriented explanations than the monolingual children, neither the older nor the younger bilingual children produced more grammar-oriented explanations than the monolingual children. Thus, increased attention to form – presumably made possible by the automatized procedures for dealing with form – does not inevitably result in form-based explanations (although it may inevitably lead to the avoidance of meaning-based explanations). In order to actually produce a form-based explanation, a child must be able to understand and articulate the violation underlying an error in a grammatical construction – an ability which does *not* appear to be heightened merely by the automatization of processing procedures engendered by the bilingual experience.

Would our results have been different had we explored the effects of bilingualism on metalinguistic abilities in younger or older children? Our data suggest that the bilingual experience may enhance the transition to a form-based approach particularly in detecting and correcting grammatical errors. It is possible, however, that if we were to observe children who are younger than those in our sample, we might find a qualitative difference in the development of the bilingual's metalinguistic skills relative to the monolingual's skills. For example, even the youngest bilinguals in our study did not produce content-oriented corrections for errors. This finding suggests either that the bilingual experience speeds the transition from a content-based to a form-based approach to corrections (as we have suggested), or it so discourages a content-oriented approach that even the bilingual child's very first responses are grammar-oriented (indeed, the bilingual children were more likely to produce no explanation than a content-oriented explanation at the youngest ages). Data on younger bilinguals might allow us to determine whether the bilingual experience alters qualitatively the course of metalinguistic development.

At the opposite end of the age spectrum, we have found that bilinguals up to the age of 8 are more able to detect errors than monolinguals of the same age (controlling for proficiency). Is this an advantage that remains with the bilingual throughout his life-span, or does the bilingual experience merely give a developmental advantage to bilinguals, an advantage which disappears as both bilingual and monolingual speakers grow older and become "saturated" with language experience? Observations from older bilinguals might provide insight into whether the bilingual experience alters the final outcome

of development (giving bilinguals an advantage at any age in "hearing" errors) or merely hurries that development along.

The relationship between metalinguistic awareness and other cognitive and linguistic capacities

One might argue that the late appearance of linguistic explanations relative to corrections and detections in our data reflects development in the child's capacity to reason and explain in general, rather than development in the child's linguistic capacities. Although possible, it is important to note that children of all ages in our study were able to give at least some explanations. The difference between the younger and older children was in their ability to give explanations based on the grammatical form of a sentence rather than its meaning.

It is likely that the ability to consider more than one dimension in a situation simultaneously is a necessary prerequisite for the ability to generate the most advanced corrections and explanations produced by the children in our study; that is, corrections and explanations based on the relationships between elements within a linguistic system. In fact, the ability to explicitly consider more than one dimension simultaneously has been found to be characteristic of children of 6 and older in a variety of cognitive and social-cognitive tasks (Collins, Berndt & Hess, 1974; Flavell, 1977; Piaget, 1978; Siegler, 1984). Nevertheless, the fact that responses showing sensitivity to a linguistic system appear in children's metalinguistic explanations several years after they first appear in children's corrections of their own and others' speech (cf. Karmiloff-Smith, 1986, and our data on corrections and explanations) suggests that this type of general cognitive ability may be necessary but cannot be sufficient to account for the more complex corrections and explanations found in our data.

Karmiloff-Smith (1986) has suggested that a recurring process of redescription in the child's internal representation of language is responsible for the ever-increasing conscious access the child has to the formal characteristics of his language. According to Karmiloff-Smith, a child's spontaneous correct usage of a linguistic construction initially stems from implicitly represented isolated procedures. However, in order for the child to have conscious awareness of this linguistic construction, the same information must be "redescribed" – that is, the child's internal representation of the construction must be restructured to unify the isolated procedures into a system. Karmiloff-Smith hypothesizes that it is this type of restructuring of (rather than adding to) the internal representation of language which makes possible conscious insight into the form and organization of language, insight which is reflected in tasks tapping metalinguistic awareness. Following Karmiloff-Smith (1986),

we suggest that it is the recurrent redescription of the information a child possesses about language which accounts for the developmental progression we find from detecting errors, to correcting errors, to explaining errors.

If Karmiloff-Smith is correct, our data allow inferences about the effects of a bilingual experience on the child's internal representation of language. The experience of learning two languages appears to restructure a child's internal representations so that the two languages become represented as two distinct *systems*, rather than simply in terms of individual form–meaning correspondences (e.g., early in development bilingual children provide evidence that they are dealing with two systems by tagging constructions according to their linguistic affiliation; Hakuta, 1986). This type of restructuring in the internal representation of language appears to facilitate detection and correction of grammatical form, but does not affect conscious access to the linguistic facts about the language one speaks. Moreover, although restructuring the internal representation of language engendered by the bilingual experience may hasten a child's progress away from a content-based and toward a form-based approach to language at all three levels of awareness, it does not alter the types of grammatical constructions the child can master at any of the three levels.

It has been suggested that learning a second language alters the way in which a child views language, changing his understanding of the principles that underly his languages (Ben-Zeev, 1977; Cummins, 1978). Our data suggest that, while learning two languages encourages a speaker to be aware of irregularities in the form of both of his languages, it does not make it any more likely that the speaker will be able to abstract the rules underlying those regularities. Nor does learning two languages appear to affect the types of violations a child can detect, correct, or explain in a rule-governed way in either of his two languages. Thus, the bilingual experience may awaken a speaker's attention to the form of his languages, but not enough to restructure what he knows about his two languages.

Although the bilingual experience does not appear to alter a child's grasp of the rules underlying his language, the experience does appear to affect his ability to recognize and correct grammatical anomalies in the speech of others. Does the enhanced awareness have any impact on the language a child uses in his spontaneous speech? Our data do not allow us to address this question directly. Nevertheless, there is evidence that other types of experiences with language (e.g., learning to read) may have an impact on spontaneous speech. For example, good readers have been found to produce more complex constructions in spontaneous speech (Fry, Johnson, & Muehl, 1970; Vogel, 1974) and to comprehend late-developing complex sentences more easily than poor readers (Mann, Shankweiler, & Smith, 1984; Smith,

Mann, & Shankweiler, 1986). Although it is impossible to determine causal direction from data of this sort, the data leave open the possibility that the experience of learning to read well alters spontaneous speech in the later stages of language-learning. One might hypothesize that the ability to recognize and correct grammatical errors -- an ability which we have found is enhanced by the experience of learning two languages, and which others have suggested is related to increased reading ability (Ryan & Ledger, 1984) – may also affect spontaneous speech during the later stages of acquisition.

In sum, we have shown that the experience of learning two languages hastens the development of linguistic awareness in young children at certain levels of awareness, but does not alter the course of that development. The bilingual experience encourages a form-based approach to language, but alters neither the types of errors a child recognizes with ease, nor the types of rule-based explanations the child gives for those errors. Thus, while learning two languages may enhance a speaker's "ear" for regularities of form, it does not appear to augment his grammatical "mind" for understanding those regularities.

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