Language Acquisition, 15:329–349, 2008

ISSN: 1048-9223 print/1532-7817 online
DOI: 10.1080/10489220802349996

Psychology Press
Taylor & Francis Group

Canonical and Epenthetic Plural Marking in Spanish-Speaking Children with Specific Language Impairment

John Grinstead
The Ohio State University

Myriam Cantú-Sánchez
Universidad Autónoma Metropolitana

Blanca Flores-Ávalos
Centro Nacional de Rehabilitación

In this study, we investigate whether specific language impairment (SLI) manifests itself grammatically in the same way in Spanish and English with respect to nominal plural marking. English-speaking children with SLI are very proficient at marking plural on nouns. Spanish has two main nominal plural allomorphs: /s/ and /es/. The /es/ allomorph has received multiple theoretical treatments, including one (e.g., Harris (1991)) which argues that in singular-plural pairs such as *flor-flores*, the /e/ is epenthetic, while other accounts (e.g., Colina (2003)) argue that synchronically there is an underlying /e/ in the singular form (e.g., *flore*) which gets deleted by apocope. Child Spanish speakers with SLI in the United States have shown mixed results in their abilities to learn plural marking. They have shown low proficiency on an elicited production task, but have shown high proficiency in spontaneous production data. We show, using a new elicited production task in Mexico with a group of children diagnosed with SLI and two control groups, that performance is close to the high levels previously shown in spontaneous production studies. Further, we show that all children's performance with the epenthetic allomorph /es/ is worse than their performance with the canonical

Correspondence should be sent to John Grinstead, Department of Spanish and Portuguese, 283 Hagerty Hall, 1775 College Road, The Ohio State University, Columbus, OH 43210-1340. E-mail: grinstead.11@osu.edu

allomorph /s/. Our results suggest that plural marking is not an axis of cross-linguistic variation between Spanish and English among children with SLI. On the basis of the absence of child errors of the *flore* type and presence of errors of the *flors* type, our data appear to support the epenthesis account of Harris (1991).

1. INTRODUCTION

One reason that specific language impairment (SLI) is interesting to linguists is that it holds out the hope of telling us something about the way in which linguistic cognition is organized. If SLI consistently affects particular aspects of language, then successful theories of language should be able to predict how the impaired aspects of language will affect those dimensions of grammar with which they interact. Failures to make such predictions should cause grammatical models to be re-evaluated. This prospect, however, seems somewhat dim on the basis of existing cross-linguistic research, which has concluded that SLI manifests itself differently in different languages. At one level it is obviously true that SLI manifests itself differently cross-linguistically. For example, child Spanish speakers in the U.S. diagnosed with SLI have been shown to have serious trouble marking gender on articles (Restrepo and Gutiérrez-Clellan (2001)). Given that English does not mark gender on articles, child English speakers with SLI cannot have trouble in this area. But what about constructions that are common to multiple languages? It has been argued, for example, that tense marking, which is common to English and Spanish, is very problematic for child English speakers (e.g., Rice and Wexler (1996)), but that it is not problematic for child Spanish speakers (e.g., Bedore and Leonard (2001; 2005), Bosch and Serra (1997)), though this is not uncontroversial (cf. Grinstead, De la Mora, Pratt, and Flores (2007)). If it is true that SLI manifests itself differently cross-linguistically in constructions that are very similar or identical, then we must either adopt the assumption that our grammatical theory is in need of revision or that SLI simply has no consistent phenotypic realization across grammars. The second conclusion is undesirable because it implies that studying SLI can tell us little about the organization of linguistic cognition. The first conclusion is slightly less problematic, though it will preferably not be entertained, unless there is no alternative. Before either of these undesirable conclusions can be reached, however, it must be empirically well-established that there is no alternative.

In the current study, we seek to determine whether Spanish and English contrast with respect to whether nominal plural marking is problematic for children with SLI. It has been shown convincingly that child English speakers with SLI have little trouble with plural marking on nouns (Oetting (1993), Rice and Oetting (1993), Oetting and Rice (1993); Rice, Wexler, and Hershberger (1998)). In contrast, the results from Spanish-speaking children with SLI being raised in the U.S. are more mixed. While the elicited production study reported

in Bedore and Leonard (2001) shows children having serious difficulty marking plural on nouns, the spontaneous production study reported in Bedore and Leonard (2005) shows no such problems. In the current study, we will attempt to clarify this conflict using an elicited production experiment that is different from Bedore and Leonard's (2001) in what we believe are methodologically crucial respects and our sample will consist of monolingual Spanish speakers in Mexico, not the U.S.

In addition to our concern with Spanish-English SLI contrasts, we seek in our study to determine whether child Spanish SLI data may inform adult linguistic theory regarding the nature of the /es/ allomorph. Is the /e/ present as a case of epenthesis adding a segment in between a consonant-final noun such as *flor* and the plural marker /s/? Or is the /e/ underlyingly present on the singular version of the noun as *flore*, but deleted by apocope in the singular and present in the plural *flores*? We will offer error data from typically developing children and children with SLI to suggest that the former account is correct.

2. PLURAL MARKING IN SPANISH

The basic rule (cf. Real Academia Española (1973), Bello and Cuervo (1945))[1] for marking plurality on nouns in Spanish is traditionally composed of two parts. The first part adds /s/ to nouns ending in unstressed vowels /a, o, e/,[2] which make up the vast majority of Spanish nouns.

(1) pato – patos
duck – ducks

(2) mesa – mesas
table – tables

(3) lote – lotes
lot – lots

For nouns ending in consonants and stressed vowels, /es/ is added. These two segments have been viewed by generative phonology as the plural morpheme /s/, preceded by a vowel /e/, which on some accounts is added by epenthesis in plurals and is absent in singulars (e.g., Saltarelli (1970), Contreras (1977), Harris (1980; 1991; 1999)) or on other accounts is underlyingly present in plurals and is deleted by apocope in singulars (e.g., Foley (1967), Harris (1970), Roca (1996)).

[1]The rules describing unproductive, irregular plurals in Spanish will not be addressed here.

[2]While there are nouns ending in high vowels /i, u/, both stressed and unstressed, they are typically borrowings from other languages, and are assimilated to the same pattern as the non-high vowels.

(4) flor – flores
flower – flowers

(5) col – coles
cabbage – cabbages

(6) bongó – bongóes
bongo drum – bongo drums

Briefly, the epenthesis view in Harris (1991; 1999) is fundamentally based on the observation that while terminal elements *-a* and *-o* may occur after any consonant or consonant cluster, there is a set of consonant clusters and singleton consonants /tʃ, x, p, t, k, b, g, f/ that are not permitted in word-final position in Spanish, and it is precisely after these sounds that /e/ occurs, as in (7) (from Colina (2003, 88)). Further, /e/ rarely occurs after the consonants that are allowed in word-final position [d, l, n, r, s, θ], as in (8) (ibid).

(7) Non-word-final Consonants
a. solemne – 'solemn'
b. parte – 'part'
c. guante – 'glove'
d. traste – 'fret' (n.)
e. nube – 'cloud'

(8) Word-final Consonants
a. sede – 'seat'
b. prole – 'progeny'
c. ere – 'r'
d. fase – 'phase'
e. cruce – 'intersection'

Harris assumes that the /e/ in the words in (7) is added to make the words conform to Spanish phonotactics and be pronounceable, while the /e/ in the words in (8) is part of the underlying representation of the word, similar to the /a/ of *mesa*. The insertion of epenthetic vowels in Spanish plurals is argued to follow from this same generalization, which forces the words in (7) to have an /e/ word finally.

A recent exposition of an an alternative view to the epenthesis analysis, presented in Colina (2003), argues that while there may have been a diachronic process of epenthesis, there is no longer a synchronic epenthesis rule in the grammar. Colina makes her argument on the basis of the exceptions to the generalization pointed out by Harris and argues that a real epenthesis rule would work exceptionlessly, as does initial epenthesis in Spanish, which is responsible for pairs such as those in (9).

(9) Initial Epenthesis

a.	hemisferio	esfera
	'hemisphere'	'sphere'
b.	yugoslavo	eslavo
	'Yugoslavian'	'Slavic'
c.	inscribir	escribir
	'inscribe'	'write'

Which of these two accounts is correct? Our data will support the existence of an active rule of epenthesis in Spanish, though the non-mutually exclusive conjecture that epenthetic plurals are lexically stored is also supported.

3. PLURAL MARKING IN TYPICALLY DEVELOPING CHILD SPANISH AND CHILD ENGLISH

There are similarities in the results for typically developing English- and Spanish-speaking children with respect to plural marking (Berko (1958), Derwing and Baker (1979), Kernan and Blount (1966), Pérez-Pereira (1989)). It is consequently worthwhile to consider these similarities as a means of judging the *a priori* plausibility of plural marking in Spanish being much more difficult than it is in English for children with SLI. Similar to Spanish, English has two canonical allomorphs: /s/ which is added to words ending in voiceless consonants, and /z/ which is added to words ending in voiced consonants and vowels. Again similar to Spanish, English has an epenthetic allomorph /ɨz/ which is added to words ending in a sibilant. These rules are illustrated in the following:

(10) cot – cots [kɑts]

(11) cod – cods [kɑdz]

(12) cow – cows [kaʊz]

(13) pass – passes [ˈpæs.ɨz]

Results of studies of typical language development show that children are proficient with plurals such as those in (10–12), but have difficulty with nouns such as (13), particularly when nonce forms are used to measure their competence. In her well-known "Wug Test" study, Berko (1958) demonstrated that preschool-aged children could mark the regular plural in English reliably on nonce words that required the allomorph /z/, with percentages correct for "wugs" (/z/) of 91%, for "heafs" (/s/) of 82%, but for "tasses" (/ɨz/), with insertion of the epenthetic vowel, only 36% correct.

Interestingly, children were able to correctly mark the real word "glass" as "glasses" (/ɨz/) with an epenthetic vowel in the plural 91% of the time. Thus, with nonce words, the canonical allomorphs /s/ and /z/ were used by children with great success, but the epenthetic allomorph /ɨz/ was much more problematic, unless they were asked to inflect a real word, in which case they were as successful as they were with the more canonical allomorphs.

Similarly in Spanish, Kernan and Blount (1966) tested child Spanish speakers in Mexico using an elicited production technique to determine their ability to mark plural on real and nonce words. They found results very similar to Berko's in English (cf. also Derwing and Baker (1977; 1979) for child English) in the sense that the most productive plural marking rule in Spanish was used very successfully by Spanish-speaking children from early on. Five- to 7-year-olds marked nonce words ending in unstressed vowels (e.g., "tifa") as plural (e.g., "tifas") 100% of the time. Similarly, in Pérez-Pereira (1989), Spanish-speaking children marked nonce nouns ending in unstressed vowels as plural correctly 92% of the time at 3 years of age ($n = 19$, mean age = 3;3). Significantly, as in English, the children in Kernan and Blount and Pérez-Pereira had great difficulty marking the nonce words with the epenthetic allomorph /es/ (similar to /ɨz/ in English). In Kernan and Blount, the 5- to 7-year-old group marked "fetor" as "fetores" only 43% of the time and the 11- to 12-year-olds only marked them correctly 53% of the time (adult controls, $n = 18$, marked them correctly 100% of the time). In Pérez-Pereira, the 3-year-olds were only able to mark "tipón" as "tipones" 36% of the time and the oldest children, 6-year-olds, only marked them 55% of the time. The design in Pérez-Pereira was quite similar to that of Berko, however, in that real word plurals were also tested. The real words that took the /es/ allomorph (e.g., "patín" and "patines") were marked correctly as plural 76% of the time by 3-year-olds, 98% of the time by 4-year-olds, and 100% of the time by 5-year-olds. This parallels the fact that Berko's children failed to mark "tass" as "tasses" (36% correct), but marked "glass" as "glasses" 91% of the time.

Interestingly, Kernan and Blount report that children's most frequent error with epenthetic forms was the repetition of the singular form and that the second most common error was to produce the word with the plural morpheme /s/ minus the epenthetic vowel. They reported no examples of singular consonant-final words surfacing with a final /e/, such as *flore*. Pérez-Pereira does not provide information regarding the types of errors made. This kind of an error would tend to support the view put forward in Harris (1991; 1999) that epenthesis applies to singular words independently of the plural morpheme and that there is not an underlying /e/ on singulars that gets deleted by apocope. Were the alternative true, we might have expected some errors of the *flore*, *ratone* variety, which were not attested. Further, on the alternative account, it would seem completely unexpected that an epenthetic plural form could show up with a plural marker,

but without the epenthetic vowel, while this is less surprising on an epenthesis account.

In summary, we see that typically developing child English and child Spanish speakers successfully mark the nonepenthetic plural in both real and nonce words in elicited production studies. Epenthetic plurals, on the other hand, were much more problematic for Spanish-speaking children, even for children as old as 12. These results suggest that, at least with respect to typically developing children, there are many similarities between plural marking in English and Spanish and that, all things being equal, one might expect that child Spanish speakers with SLI should have similar problems with plural marking to those of child English speakers with SLI. The results also appear to support the epenthesis view of the nature of word-final /e/ in plurals.

4. PLURAL MARKING IN ENGLISH-SPEAKING CHILDREN WITH SLI

The longitudinal study of child English speakers with SLI reported in Rice, Wexler, and Hershberger (1998) shows children with SLI marking plurals above 90% at age 5, which would seem to suggest overall that plural marking is not a problem. This is similar to the result from Spanish-speaking children with SLI from Bedore and Leonard (2005), which we alluded to.

However, in a study that provides greater detail with respect to children's performance with particular plural-marking allomorphs, Oetting and Rice (1993, Table 6) show that production of the epenthetic allomorph was indeed the most problematic aspect of plural marking tested. Oetting and Rice tested plural marking through elicited production of regular plurals (both frequent and infrequent), irregular plurals and nonce forms. Among the real word regular and irregular plurals, the epenthetic allomorph was the most difficult for all children tested, including age controls (mean age = 60 months) with 84% correct, language controls (mean age = 35 months) with 53% correct, and children with SLI (mean age = 60 months) with 38% correct. Among the nonce words, the epenthetic allomorph was again the most difficult for all groups. In fact, for all groups and all word types, the epenthetic plural allomorph of a nonce word for children with SLI had the very worst performance of any form in the study (5.5% correct, 0.22/4 correct nonce words with the epenthetic allomorph produced on average, $n = 18$). The control groups' performance was also poor (age controls–30% correct, language controls–15% correct). Also important to note here is that among the frequently pluralized words, with nonepenthetic allomorphs, all groups of children in this study performed above 90%, including the SLI children. What we see for English-speaking children, then, is that the epenthetic is much harder than the nonepenthetic plural and that infrequent words are much

harder than frequent words. Finally, for English-speaking children with SLI, the epenthetic and infrequent words appear to be harder than they are for either control group with either real or nonce words.

Oetting and Rice explain this problem with the epenthetic allomorph as essentially a function of word frequency. That is, they argue that epenthetic forms are stored in memory and not morphosyntactically computed on-line, following the "dual mechanism" assumptions of Pinker (1984) and Marcus et al. (1992). Consequently, they show frequency effects, unlike the canonical plurals which result from the application of productive grammatical rules, but like nonce plurals or low-frequency epenthetic real plurals. We will speculate later that such an explanation seems likely for child Spanish as well.

5. PLURAL MARKING IN SPANISH-SPEAKING CHILDREN WITH SLI

As alluded to above, Bedore and Leonard (2001) tested 15 children with SLI along with equal numbers of age and Mean Length of Utterance (MLUw) controls, using an elicited production task. In this task, experimenters asked children a simple *wh*-question of the form *¿Qué hay aquí?* 'What is there here?', while pointing to drawings of multiple objects, to which the expected answer was "osos" or bears, when the experimenters were pointing to a picture with multiple bears. It is likely that this task was slightly too demanding, however, inasmuch as it presupposes child knowledge of the names of all of the objects used and asks children to retrieve the name of the object from memory before pluralizing it. Perhaps most importantly, the task is pragmatically unconstrained in that it can also be felicitously answered with a singular noun answer (i.e., "a bear"), depending on which object or objects the child deems salient in the context. These factors may be responsible for the relatively low percentages correct, reported in their Table 4 for the three groups, which is summarized in Table 1.

TABLE 1
Mean Percentage Correct on Plural Marking Task
(Compiled from Bedore and Leonard (2001))

Spanish Plural Allomorph	*SLI*	*MLUw-Matched Controls*	*Age-Matched Controls*
/s/	54.87%	75.13%	97.07%
/es/	57.80%	73.33%	93.33%
Average	56.34%	74.23%	95.20%

SLI = specific language impairment; MLUw = Mean Length of Utterance in words.

TABLE 2
Mean Percentage Correct Plural Marking in Obligatory Contexts in Spontaneous Speech
(Compiled from Bedore and Leonard (2005, 217))

SLI	*MLUw-Matched Controls*	*Age-Matched Controls*
92.87%	99.0%	98.87%

The reported percentages for both the SLI and MLUw-matched control groups in this study are surprising, especially for the canonical /s/ allomorph, because the literature on plural marking in children with SLI (Bosch and Serra (1997), Sanz-Torrent, Aguilar, Serrat, and Serra (2001), Eng and O'Connor (2000)) and typically developing children (e.g., Kernan and Blount (1966)) reports high rates of success. In Kernan and Blount, for example, children show high proficiency in marking plural with the /s/ allomorph (92% for children aged 3;3, $n = 19$) and low rates of proficiency with the /es/ allomorph (36% for the same group), while Bedore and Leonard's (2001) SLI and MLUw-matched control groups show low proficiency with both allomorph types (for the SLI group, for example, 55% correct for the /s/ allomorph and 58% correct for the /es/ allomorph). In Bedore and Leonard's (2005) spontaneous production study, however, all groups are highly proficient at marking plural. In this study, plural marked nouns in obligatory contexts are counted; however, no distinction is made between the /s/ and the /es/ allomorphs in their analysis. Their results, summarized in Table 2, are strikingly different from the results of their previous, elicited production study given in Table 1.

Because these data are from a spontaneous production study, it is not surprising that the children performed as well with the epenthetic allomorph as they did with the canonical allomorph given that Pérez-Pereira (1989) has shown that children are highly accurate at providing the epenthetic plural for consonant-final nouns when the nouns are real words, not nonce words. Of course the spontaneous production study would have only included real words, with which the children were familiar and comfortable, since they (and not the experimenters) were choosing which words to utter. Consequently, while these results could possibly reflect children's mastery of plural marking, it seems more likely that they reflect the existence of lexically stored plurals, illustrated by the "glasses" (91% correct) vs. "tasses" (36% correct) contrast in Berko's (1958) results.

Summary

In summary, typically developing child speakers of English and Spanish are able to correctly mark nonce nouns with canonical plural forms, but are much less

successful when the nonce forms require insertion of an epenthetic vowel (e.g., "tasses" in English, "fetores" in Spanish). These children are nonetheless able to provide real word versions of both canonical and epenthetic plurals with high degrees of accuracy in elicited production tasks, suggesting the memorization of the epenthetic forms as lexicalized units.

While a longitudinal study of SLI in English (Rice et al. (1998)), which does not separately report plural marking on nouns by allomorph type, shows high overall proficiency of plural marking, the elicited production study of Oetting and Rice (1993) does report nouns by allomorph type and shows that English-speaking children with SLI have serious trouble producing correctly marked epenthetic plurals. These facts lead us to believe that the high proficiency shown in Bedore and Leonard's (2005) spontaneous production study may show Spanish-speaking children with SLI to be slightly more proficient than they really are at plural marking. On the other hand, for methodological reasons, we suspect that Spanish-speaking children with SLI may be somewhat more proficient at plural marking than the elicited production study of Bedore and Leonard (2001) shows them to be.

We now turn to a new elicited production study of real words with Spanish-speaking children in Mexico City, which attempts to clarify the conflict between the elicited and spontaneous production results just summarized.

6. THE STUDY

6.1. Method

6.1.1. Participants

Three groups of Spanish-speaking children were recruited in Mexico City: nine children with specific language impairment, nine children matched for chronological age, and nine younger children matched for MLUw. All children were monolingual Spanish speakers.

Children in the SLI group were recruited from the caseloads of speech-language pathologists in Mexico City. To be included in the study, children had to meet the following criteria. First, they had to have test scores of 1.25 standard deviations below the mean on a standardized Spanish language test, normed on monolingual Spanish-speaking children from the same speech community, following convention (Leonard (1997)). The test employed was the Batería de Evaluación de la Lengua Española (BELE) of Rangel, Romero, and Gómez (1988), a test that was normed in Mexico City on children of the age (3–5 years) and geographical dialect (Mexico City) of our subjects. From the seven BELE subtests, each of which is normed separately, we chose to use the two subtests that focus on grammatical comprehension ("comprensión, adivinanzas") and the two subtests that focus on elicited production of sentence-level grammar

("producción dirigida, definiciones"). To be included in our sample, then, children had to have scores 1.25 *SD*s below the mean on at least two of these subtests, one comprehension and one production.[3]

Further, children had to possess a nonverbal IQ of at least 85. This was measured using the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) Spanish translation. With respect to hearing, the children were given thorough hearing tests and had to pass them at conventional levels. Further, parental report and medical history had to suggest no recent episodes of otitis media with effusion in order for a child to be included. Similarly, neurological tests determined that the children were not neurologically impaired. With respect to oral structure and oral motor function, initial examination ruled out structural anomalies and assured normal function. Parental report and family history interviews ruled out concerns pertaining to social and physical interactions.

In addition to the conventional inclusionary and exclusionary criteria, we also used the parental interview developed by Restrepo (1998) which has been validated as an instrument of identification of children with SLI. Only children whom the interview identified as SLI were included. Finally, we applied a phonological screen, using 25 nonce words, the final segments of which were identical to those tested in multi-morphemic contexts /es, os, as/, in the same prosodic environments. In this screen, children had to pronounce nonce words such as "cordes," "boros," and "noras" without omitting either of the two final segments on the words in order to be included in the study. This was a simple repetition task with no visual stimuli. In this way, we sought to exclude the possibility that children who failed to form plurals on our task were doing so as a function of phonological problems. Children had to produce at least 4 out of 5 correctly from each category in order to be included in the study.

In order to construct a language control group, we used Mean Length of Utterance in words (MLUw) as our measure of language development, following Gutiérrez-Clellen, Restrepo, Bedore, Peña, and Anderson (2000). Mean Length of Utterance was chosen because it appears to be the empirically most well-founded measure currently available. That is, because many grammatical dimensions may be encoded by zero morphemes in Spanish, it would seem imprudent to attempt to calculate an MLU in morphemes, along the lines of Linares-Orama and Sanders (1977), for fear of giving children credit for mastery of aspects of Spanish grammar without actual evidence that they are able to manipulate the relevant contrasts (e.g., subjunctive vs. indicative, imperative vs. interrogative, etc.). Mean Length of Utterance was calculated by transcribing 30-minute spontaneous speech samples from each child, which was performed by native Spanish-speaking, speech-language pathologists and linguists of the same dialect as the children. The number of words produced in the first 100 utterances

[3]The other three subtests consist of an articulation test, a narrative elicitation, and a test involving spatial knowledge, which seemed irrelevant to our purposes.

was then counted and divided by 100. The children's speech was divided into utterances, following the CHAT format guidelines of the CHILDES Project (MacWhinney (2000)).

The participants' characteristics are summarized in Table 3. The age-matched control group consisted of 9 typically developing children whose average age matched that of the SLI group. The SLI group's average age in months is 57, and the average age in months of the age-matched group is 57. The age-matched group's MLUw was 4.43, with a standard deviation of 1.57. The language-matched control group consisted of nine typically developing children whose average MLUw matched that of the SLI group. The SLI group's average MLUw was 3.0 and the average MLUw of the language-matched group was 3.0. The language-matched group's average age was 50 months, with a standard deviation of 8.4 months. All of the control group children passed the phonological screen and had no reported language problems, though they were not given the other diagnostic tests given to the SLI children.

6.1.2. Procedures

Children were shown pages containing two pictures. The first contained a single item and the second contained two of that same item. The investigator would then tell the children while pointing to the first picture, for example, *Aquí tengo una mariposa* 'Here I have a butterfly'. Then, the investigator would point to the second picture (with two butterflies in it) and say, *¿Y aquí?* 'And here?' This format keeps task demands to a minimum by giving children the singular version of the word they are to pluralize, instead of asking them to recall from memory the name of the object represented in a picture. Further, by creating a context in which there were two different pictures that differed only as a function of the number of objects represented, we attempted to make a plural answer to the second question as pragmatically necessary as possible. We also avoided using a *wh*-question such as *¿Qué hay aquí?* 'What is there here?', because Van der Lely and Battell (2003) have shown that the production of *wh*-questions can be problematic for at least some English-speaking children with SLI. Assuming that children have one production/comprehension grammar, there exists a strong possibility that a population of children who have problems

TABLE 3
Experimental and Control Group Characteristics

Group	*SLI* ($n = 9$)	*Age Controls* ($n = 9$)	*Language Controls* ($n = 9$)
Mean MLUw	**3.0** ($SD = 1.05$)	4.43 ($SD = 1.57$)	**3.0** ($SD = 0.78$)
Mean age in months	**57** ($SD = 4.5$)	**57** ($SD = 4.63$)	50 ($SD = 8.4$)

producing *wh*-questions, as documented by Van der Lely and Battell (2003), could also have trouble understanding *wh*-questions.

Consequently, we adopted what we deemed to be the most conservative testing approach, namely, excluding from the testing protocol grammatical structures which might cause a child to fail because the protocol itself was not understood, rather than because the dimension of grammar being tested is impaired.

The test items included 10 canonical nouns that end in /a/, 10 canonical nouns that end in /o/, and 10 nouns with word-final consonants /l n ɾ/, listed below. All of these words were taken from the Spanish language version of the MacArthur Communicative Development Inventory (CDI) (Jackson-Maldonado, Bates, and Thal (1992)) to increase the likelihood that they would already exist in the children's vocabularies, given that our goal was to test real-word and not nonce-word performance.

/o/-Final Words	/a/-Final Words	Consonant-Final Words
Mono	Vaca	León
Perro	Rana	Ratón
Pollo	Tortuga	Tren
Sombrero	Silla	Árbol
Vaso	Mesa	Pastel
Huevo	Naranja	Avión
Plato	Estrella	Tenedor
Cepillo	Caja	Papel
Oso	Cama	Flor
Zapato	Araña	Sol

Answers were counted as correct if the adult target was produced. Other answers were categorized as either incorrect (e.g., "dos león"—two lion, "dos leóns"—two lions), irrelevant (e.g., "animales"—animals, when the picture was of mice) or no answer. All answer types were counted separately.

6.2. Results

The overall percentage results are given in Table 4. There were no null answers, that is, children responded to all items, nor were there irrelevant answers.

After applying an arcsine transformation to our percentage data, a one-way ANOVA was performed, with group as the between-subjects variable; the three groups were compared for their performance on all plural marking, which was the dependent variable, and the result was nonsignificant: $f(2, 24) = 1.179$, $p = .325$. A similar ANOVA, with group as the between-subjects variable, and epenthetic plural marking as the dependent variable also produced nonsignificant results: $f(2, 24) = 0.744$, $p = .486$. Finally, a one-way ANOVA with group as the between-subjects variable and with canonical plural marking as the dependent variable showed a significant difference: $f(2, 24) = 3.714$,

TABLE 4
Summary of Proportion of Correct Answers to
Real Word Plural Elicitation Task

	Proportion of Correct Responses for Plural Marking Test	
Treatment Group	*Mean*	*Standard Deviation*
SLI	88.5% (239/270)	3.54
Age-matched	93.7% (253/270)	3.10
MLUw-matched	95.5% (258/270)	1.58

TABLE 5
Correct Answers by Plural Type Across the Three Groups

	SLI	*Age-Matched*	*MLUw-Matched*	*Total*
/s/	97.8% (176/180)	99.4% (179/180)	100% (180/180)	99.1% (535/540)
/es/	70% (63/90)	82.2% (74/90)	86.7% (78/90)	80.0% (215/270)

$p = .039$. Post-hoc tests of least significant differences showed that the SLI group was significantly worse than the language control group ($p = .015$), though not worse than the age control group ($p = .061$).

In Table 5, we see that children with SLI made errors not only with epenthetic nouns, but also with canonical nouns. Ultimately, however, their proficiency with plural marking on canonical nouns was almost perfect (97.8% correct), though there was a significant difference between their performance and the performance of the MLUw matched group marking plural on canonical nouns. We suspect that with a larger sample or younger children, this difference would disappear.[4] Overall, our findings are reminiscent of English-speaking children's performance on tests of plural marking. Indeed, we see in Table 5 and Figures 1 and 2 that all children made many more errors with epenthetic nouns (20%) than they did with canonical nouns (0.08%). This difference is significant by paired samples t-test, $t(26) = -3.481$, $p < .002$, two-tailed.

As with the children studied in Kernan and Blount (1966), overwhelmingly the most common error across all three groups was to produce the singular form of the noun. This is illustrated in Table 6.

The second most common error was to add the plural morpheme /s/ to the consonant-final nouns, without the epenthetic vowel. For example, for the adult target plurals *flores* 'flowers', *trenes* 'trains', and *árboles* 'trees', children would

[4]The nonparametric Mann-Whitney U test showed the same results, a signifcant difference for SLI vs. Language Controls ($p = .028$) and nonsignificant results for SLI vs. Age Controls ($p = .125$).

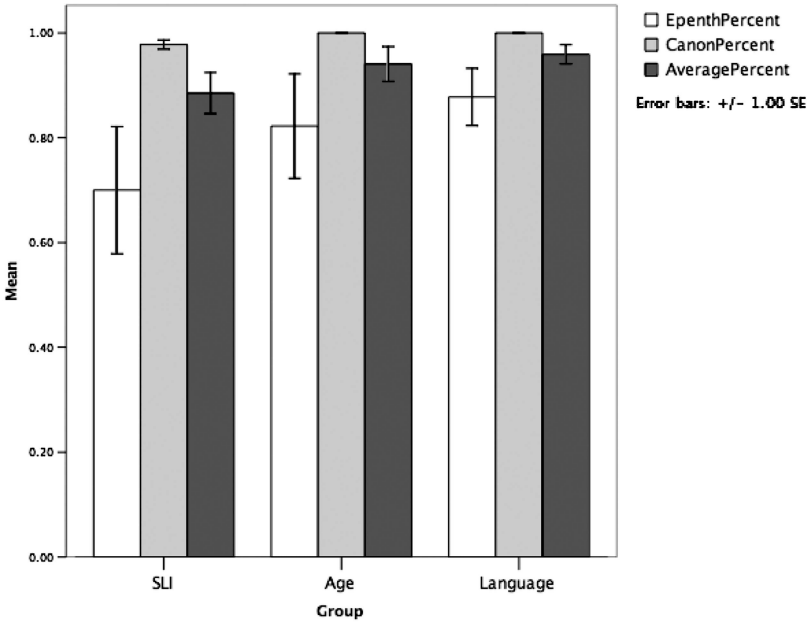

FIGURE 1 Mean scores for each allomorph for all groups.

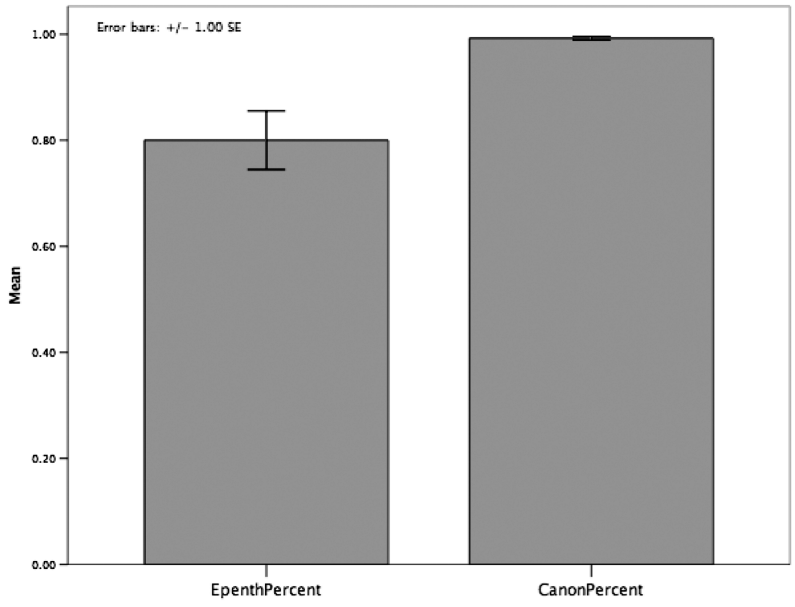

FIGURE 2 Comparison of overall plural marking in all groups by allomorph.

TABLE 6
Number and Type of Errors by Group Attempting to Produce a Plural Epenthetic Noun

Group Attempting, e.g., soles	*Singular Noun Errors (e.g.,* sol*)*	*Plural Nouns with No Epenthetic Vowel (e.g.,* sols*)*
SLI	21	5
Age-matched	11	1
MLUw-matched	14	2

produce "flors," "trens," and "arbols."[5] The SLI children produced a substantial number of these errors, while the control group children also produced them, though in smaller numbers. There were no examples of singular nouns with final /e/ vowels, e.g., "flore," "trene," "arbole." All errors were errors of comission (substitution) and not of omission, that is, all children answered all items with relevant answers.

Summarizing, children were highly proficient at marking plurals in our experiment. As a group, children were significantly worse at marking plurals on consonant-final nouns than they were at marking plurals on canonical nouns, consistent with both Spanish and English results for typically developing children and English results for children with SLI. Further, when canonical and epenthetic allomorph scores were averaged, children with SLI were somewhat worse than both control groups, though not significantly so. Nor was the SLI group significantly worse at marking epenthetic plurals than the control groups. However, the SLI group was significantly worse than the MLUw-matched control group with canonical plurals. Epenthetic errors consisted of either a singular noun or a plural marked noun with no epenthetic vowel. There were no errors consisting of singular noun + /e/, as one might expect on the apocope account.

7. DISCUSSION

The overall pattern observed—more proficient canonical plural marking and less proficient epenthetic plural marking—is consistent with existing research into SLI in English and typical child language development in Spanish and English, two languages which are similar in having epenthetic plural allomorphs. By

[5]As pointed out by a reviewer, the absence of the epenthetic vowel in these cases could be attributed to the Central Mexican dialect feature that reduces /e/ between two consonants, as in coches [kotSs] vs. coches [kotSes]. This phenomenon, however, according to Perissinotto (1975) occurs only between voiceless consonants, and all of our stimuli include a voiced consonant before the epenthetic vowel.

showing this, our study has added to the debate regarding plural marking in the Spanish SLI literature between Bedore and Leonard (2001), which showed low proficiency in plural marking on an elicited production task, and Bedore and Leonard (2005), which showed high proficiency in plural marking in spontaneous production. Our study shows that Spanish-speaking children with SLI can perform on an elicited production task at high levels of proficiency, comparable to the levels demonstrated in spontaneous production.

Returning to our questions, how does the data provided inform the discussion of whether SLI manifests itself differently in different languages? Apparently, despite learning a language that marks both gender and number on plural nouns, which English does not, Spanish-speaking children with SLI appear to perform very proficiently with nonepenthetic plurals and poorly with epenthetic plurals, roughly as do English-speaking children with SLI. Thus, our study is consistent with those findings in the literature which suggest that plural marking is not an axis of cross-linguistic variation in SLI grammars.

Why are the results of this study so dramatically different from those of Bedore and Leonard (2001)? Comparing Table 1, compiled from Bedore and Leonard (2001), and our Table 5, we see very large differences in spite of the fact that both SLI groups were of a similar age (3–5 years in both studies). Comparing Table 1 and Table 4, we see that the 3-year-old language controls in Bedore and Leonard scored 74% overall, while our language controls scored 96% overall. But does this mean that their children's language competence is not as advanced as ours or does it reflect the different ways that we measured it? One reason to suspect that the Spanish-speaking children from the U.S. in Bedore and Leonard's sample may have delayed development of their Spanish comes from a comparison done in earlier work between adjective plural marking in Bedore and Leonard (2001) and Grinstead, Cantú, and Flores (2004). In this study, Grinstead et al. (2004) used a very similar elicited production task compared to the one used in Bedore and Leonard (2001). The children in the two studies were close in age and the main difference between the studies appears to be the fact that the Grinstead et al. sample was from Mexico, while Bedore and Leonard's was from the U.S. Tables 7 and 8 illustrate the difference.

In comparing Tables 7 and 8, we see that even the 3-year-old MLUw controls in the Mexican sample appear to have higher proficiency (99% correct) than do the 5-year-old age controls in the U.S. (91% correct), as well as the MLUw controls in the U.S. (76%). This suggests that language contact may play a role in the difference in this study. It also seems likely that the raw number of hours per day that U.S. Spanish-speaking children hear Spanish could be significantly lower than for the Spanish-speaking children in Mexico. This could delay their Spanish syntactic development.

For the present study, it is impossible to know whether language contact or measurement differences may have had a bigger effect on the results. With respect to the children's Spanish language development, the MLUw means of

TABLE 7
Adjective Agreement from Bedore and Leonard's (2001) Spanish-Speaking Children in the U.S. (Compiled from Bedore and Leonard (2001, 918, Table 8))

	Masculine Singular	*Feminine Singular*	*Masculine Plural*	*Feminine Plural*	***Total***
SLI	49/60 (82%)	43/60 (72%)	22/30 (73%)	16/45 (36%)	**130/195 (67%)**
MLUw	51/60 (85%)	46/60 (77%)	27/30 (90%)	24/45 (53%)	**148/195 (76%)**
Age	57/60 (95%)	55/60 (92%)	30/30 (100%)	35/45 (78%)	**177/195 (91%)**

the Bedore and Leonard children (2.85) were somewhat lower than ours (3.0), though not dramatically so. This, too, might reflect a large enough difference to explain the contrasting results. Future research will hopefully clarify this question.

Regarding the epenthesis-apcocope debate regarding the nature of the /e/ in *flores* type words, the particular type of error children made with epenthetic plurals, producing *flors* instead of the target-like *flores*, appears to support Harris's (1991) argument that forms like *flores* are in fact computed on-line by a rule of epenthesis which is active in synchronic grammar. If these nominal stems underlyingly included a final /e/, as in the apocope analysis, then we would not expect "flors" but rather the adult form "flores" to be produced. Further, we might expect some of the singular form errors, the most common error type, to have included this underlying /e/ (e.g., *flore*), which was unattested. It is rather easier to imagine that the epenthesis rule, separate from simply adding the /s/ plural morpheme, might develop at a different rate than does addition of the /s/ morpheme.

A final question involves the relationship between canonical and epenthetic plurals as putative products of distinct cognitive processes, along the lines suggested by Pinker (1984) and Marcus et al. (1992). Oetting and Rice (1993) show that for language-impaired, English-speaking children, epenthetic plurals are harder than nonepenthetic plurals and that less frequent nouns in general are harder than more frequent nouns. Our age control group is both older and more linguistically sophisticated than our MLUw control group and yet the

TABLE 8
Adjective Agreement from Grinstead et al.'s (2004) Spanish-Speaking Children in Mexico

	Masculine Singular	*Feminine Singular*	*Masculine Plural*	*Feminine Plural*	***Total***
SLI	35/36 (97%)	33/36 (92%)	33/38 (87%)	30/39 (77%)	**131/149 (88%)**
MLUw	38/38 (100%)	37/37 (100%)	37/39 (95%)	32/35 (91%)	**144/149 (97%)**
Age	38/38 (100%)	38/40 (95%)	40/40 (100%)	38/40 (95%)	**150/154 (97%)**

MLUw control group did slightly better at forming epenthetic plurals. Such a result, especially in our relatively small sample, is not unexpected if epenthetics are in fact stored as whole units in the lexicon. That is, because Oetting and Rice (1993) found that epenthetic noun plurals show frequency effects, they are likely to be sensitive to the input, in a way that regular plurals are not. Notice that their conclusion is consistent with the findings of Berko (1958) that high frequency real-word epenthetic plurals like "glasses" were easy for children (91% correct), while (obviously very low frequency) nonce words like "tasses" were very difficult (36% correct).

Consequently, it seems likely, if speculatively so, that the epenthetic plurals that the younger children in our study more proficiently marked as plural than did the older children were simply more frequent in the younger children's input than they were in the input of the older children. Convincing evidence for such a conclusion lies outside the scope of this study as it would be necessary to have frequency measures of the nouns we tested in children's actual adult input; however, such an account would seem to be the most promising explanation of these facts.

ACKNOWLEDGMENTS

The authors would like to thank the following for their thoughtful comments, suggestions and other help in carrying out this study: three anonymous reviewers from *Language Acquisition*, Johanne Paradis, Fernando Lozano, Juliana De La Mora, Teodoro Flores, Mabel Rice, María Ángeles Llorente, Guadalupe Tovar, James Harris, Sonia Colina, Fernando Martínez-Gil, Javier Gutiérrez-Rexach, José Lema, Antoinette Hawayek, Dieter Wanner, Laura Wagner, and Peter Culicover.

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Submitted 12 December 2007
Final version accepted 24 June 2008