The development of articles in children's early Spanish: Prosodic interactions between lexical and grammatical form

Katherine Demuth, Meghan Patrolia, Jae Yung Song and Matthew Masapollo

First Language published online 8 July 2011
DOI: 10.1177/0142723710396796

Article

FIRST LANGUAGE

First Language
1–21

DOI: 10.1177/0142723710396796
fla.sagepub.com
SAGE

The development of articles in children's early Spanish: Prosodic interactions between lexical and grammatical form

Katherine Demuth
Macquarie University, Australia

Meghan Patrolia
Brown University, USA

Jae Yung Song
University of Wisconsin-Milwaukee, USA

Matthew Masapollo
McGill University, Canada

Abstract

Studies of English and French show that children's first articles are more likely to appear when they can be prosodified as part of a disyllabic foot (cf. Gerken, 1996; Demuth & Tremblay, 2008). However, preliminary studies of Spanish suggest that children's first articles appear in larger prosodic structures, possibly due to the higher frequency of longer words. To assess this issue, this study examined longitudinal data from two Spanish 1- to 2-year-olds. As expected, both produced their early articles with monosyllabic and disyllabic nouns, rapidly expanding article use to trisyllabic nouns as well. The results suggest that the prosodic complexity of the lexicon plays an important role in the development of prosodic structure, providing the context for early prosodic licensing of grammatical morphemes.

Corresponding author:
Katherine Demuth, Linguistics Department, Macquarie University, Sydney, NSW 2109, Australia.
Email: katherine.demuth@mq.edu.au

Keywords
acquisition, articles, prosodic licensing, prosodic words, Spanish

1. Introduction

Children's knowledge of grammatical function items has been a topic of theoretical interest since Berko's (1958) use of *wug* tasks. Subsequent research by Brown (1973) provided a framework for investigating children's acquisition of grammatical morphemes over time. Much of this work suggested that some grammatical morphemes were acquired earlier or later than others due to factors of *semantic* complexity. More recently, some researchers have taken this further, proposing that children are more likely to supply English inflectional tense morphemes under certain aspectual conditions (e.g., Bloom, Lifter, & Hafitz, 1980; Hyams, 2007). Still others suggest that the protracted development of certain grammatical morphemes is due to a lack of *syntactic* representations (e.g., Radford, 1990; Wexler, 1994). However, none of these proposals provides an explanation for why children might be more likely to produce or omit a particular grammatical morpheme in a particular utterance.

Other researchers have suggested that children's variable production of inflectional morphemes may be *phonologically* conditioned. For example, Marshall and van der Lely (2007) found that children with language impairment were less likely to produce the past tense morpheme when it was part of a consonant cluster (cf. *play*ed vs. *coo*ked). Similarly, Song, Sundara, and Demuth (2009) found that typically developing English-speaking children were more likely to produce 3rd person singular *–s* when it formed a simple rather than complex coda (e.g., *see*s vs. *hi*ts). Constraints on phonological (or prosodic) representations have also been proposed to explain some of the variable production of articles in children's early speech (e.g., Gerken, 1996; Demuth & Tremblay, 2008). Together, these results suggest that children tend to produce their first grammatical morphemes in phonologically simple, 'unmarked' contexts. We call this the Prosodic Licensing Hypothesis (see Demuth & McCullough, 2009, for review). This is explored more fully below.

1.1 Prosodic constraints on the production of articles

Gleitman and colleagues were some of the first to suggest that there was an interaction between children's phonological and syntactic competence (e.g., Gleitman, Gleitman, Landau, & Wanner, 1988). Gerken and colleagues then conducted a series of studies showing that children had an early perceptual awareness of articles, and were more likely to produce them in certain prosodic contexts (Gerken, 1991, 1994a, 1994b; Gerken & McIntosh, 1993). In an elicited production study, Gerken (1996) showed that English-speaking 2-year-olds were more likely to preserve articles when these could be prosodified as part of a disyllabic trochaic foot (1a), but tended to omit them more often when these remained unfooted (1b) (indicated by the parentheses). Further support for this finding comes from a longitudinal study of 1- to 2-year-olds' spontaneous speech productions, where children began to produce footed articles in 70–80% of obligatory contexts between 1;7 and 2;1 (Demuth & McCullough, 2009).

(1) a. He kicks the piggy.
[S w]$_{Ft}$ [S w]$_{Ft}$
b. He catches (the) piggy.
[S w]$_{Ft}$ w [S w]$_{Ft}$

One might expect these prosodic constraints on grammatical form to be specific to the prosodic characteristics of English. However, Demuth and Ellis (2009) showed that similar constraints were found with respect to the production of noun class prefixes in Sesotho (compare (2a) and (2b); see also Connelly, 1984), and Demuth and Tremblay (2008) reported similar findings for determiners more generally in French (compare (3a) and (3b)). Once again, these morphemes first appear around 1;7 in both languages, suggesting that some access to the syntax and semantics of these morphemes is available around this age. Note, however, that the type of foot varies across languages: in both English and Sesotho the foot is trochaic (initial stress), whereas in French the foot is iambic (final stress). Thus, the nature of the foot is determined by language-specific factors. However, in all cases these findings can be explained in terms of constraints on children's representations at the level of the phonological word (PW) and/or the phonological phrase (PP):

(2) Sesotho noun class prefixes (trochaic SW feet)
a. [mo-tho]$_{Ft}$ 'person'
b. (mo)-[sadi]$_{Ft}$ 'woman'

(3) French determiners (iambic WS feet)
a. [du lait]$_{Ft}$ 'some milk'
b. (la) [couronne]$_{Ft}$ 'the crown'

In all the above languages, children tend to produce prenominal grammatical morphemes earlier and more reliably when these can be prosodified as part of a disyllabic foot. That is, children's variable production of grammatical morphemes appears to be due to constraints on phonological rather than syntactic representations. Over time, children's prosodic representations become more complex, gradually allowing for the incorporation of more lexical and grammatical structure. Further support for this position comes from word truncation in English, where word-initial unfooted syllables exhibit the same pattern of omission until around the age of 2;6 (e.g., *banana* > *nana*) (cf. Pater, 1997).

There have been several hypotheses about why disyllabic feet should have such a privileged status in children's early grammars. One proposal is that minimal words, or binary feet, are the unmarked form of words across languages (Prince & Smolensky, 2004). Since children's early speech tends to include unmarked structures, it is reasonable that minimal words/binary feet might have a privileged status, and that this might persist (e.g., Demuth, 1995, 1996; Fikkert, 1994). This contrasts with the proposal that there is an early articulatory bias toward reduplicative babbling, and that this CVCV frame/content structure transfers to the production of early words (e.g., Davis & MacNeilage, 1995; MacNeilage, 1998). However, it has also been noted that the frequency of prosodic structures in the ambient language may influence the phonological shape of children's early syllables and words, and how these develop over time. For

example, Levelt, Schiller, and Levelt (2000) noted that Dutch-speaking children's development of syllable structures follows closely the frequency with which these are represented in the adult input they hear.

It is therefore of significant interest that English and French have few trisyllabic words in the lexicon. Furthermore, both languages have many monosyllabic words, such that articles can be easily prosodified as part of a disyllabic foot. However, a language like Spanish has many more disyllabic and trisyllabic words. Furthermore, Roark and Demuth (2000) showed that most of the trisyllabic words in the input Spanish-speaking children hear have medial stress, resulting in a high proportion (28.3%) of words that begin with an unfooted syllable (e.g., *manzana* 'apple'; stressed syllable underlined). This contrasts with English, where only 3.8% of words in the input contain an initial unfooted syllable (e.g., *banana*). Demuth and Johnson (2003) similarly showed that only 7% of words in the input French-speaking children hear are trisyllabic (e.g., *mandarine* 'mandarin'). Thus, although disyllabic words with initial stress are the most common in Spanish (e.g., *mesa* 'table'), almost a third of the lexical items Spanish-speaking children hear contain an initial unfooted syllable. One might therefore expect that children learning Spanish would produce three-syllable words with an initial unfooted syllable earlier than their English- and French-speaking peers. If so, this raises the possibility that articles could also be produced earlier with disyllabic words in Spanish (e.g., *la mesa* 'the table') than they would be in languages like English and French. Preliminary studies of Spanish indicate that this is the case (Demuth, 2001; Lleó, 1996, 2006). These issues, and the prosodic structure of Spanish more generally, are discussed in more detail below.

1.2 The prosodic development of lexical and grammatical items in Spanish

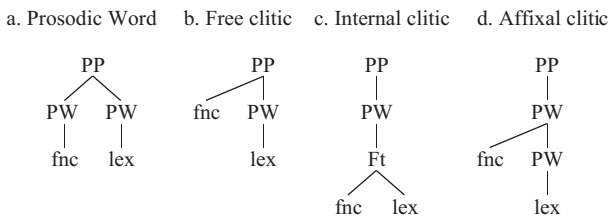
The different levels of prosodic structure can be captured in terms of the Prosodic Hierarchy, shown in (4) (Nespor & Vogel, 1986; Selkirk, 1984):

(4) The Prosodic Hierarchy

Utt	(Phonological utterance)	*I saw the inspector give the boy a dog*
IP	(Intonational phrase)	*I saw the inspector*
PP	(Phonological phrase)	*the inspector*
PW	(Prosodic word)	*inspector*
Ft	(Foot)	*pector*
σ	(Syllable)	*pec*
μ	(Mora)	*pe*

Selkirk (1996) also provides a 'typology' of prosodic structures that grammatical function items may assume. These are presented in (5), where *fnc* represents (closed class) grammatical functional items, and *lex* represents (open class) lexical items:

(5) The Prosodic Structure of Grammatical Function Items



Selkirk (1996) showed that the prosodic representation of grammatical function items can vary both within and between languages, depending on the prosodic characteristics of a given grammatical morpheme. For example, articles in English, French, and Spanish are typically assumed to prosodify as free clitics at the level of the PP, as shown in (5b). However, Gerken (1996) and Demuth and McCullough (2009) suggest children's earliest articles in English are actually prosodified as part of a foot, as shown in (5c). Only later do these children develop adult-like representations, prosodifying articles at the level of the PP (5b). Demuth and Tremblay (2008) similarly proposed that French-speaking children first prosodify determiners as internal clitics (5c), then as affixal clitics (5d), and finally as adult-like free clitics (5b). Selkirk (1996) suggested that unfooted syllables like the function items in (5b) violate constraints on exhaustivity. That is, they are syllables that are not immediately dominated by a foot – the next highest level of structure within the Prosodic Hierarchy. In keeping with Gerken (1996), we suggest that children's use of such marked structures typically takes time to develop. This helps explain the fact that English-speaking children omit the first syllable of *ba*n*a*n*a*, as well as the unfooted article in structures like that in (1a). Demuth and Tremblay (2008) also suggested that the growth of prosodic structure within the lexicon eventually stimulates French-speaking children's ability to prosodify articles at higher levels of prosodic structure (i.e., Ft > PW > PP). That is, as the lexicon develops, permitting words of greater length, so does children's acquisition of adult-like prosodic representations. This ultimately results in children's more consistent use of articles with longer, prosodically more complex words.

Since Spanish has many more prosodically complex (three- and four-syllable) lexical items than either English or French, this could promote earlier access to higher levels of prosodic structure. If so, we would predict rapid overall acquisition of articles in Spanish, and little difference in their early use with one- and two-syllable lexical items. However, given previous results from English and French showing that children were better at producing articles in prosodically simpler contexts, we might also expect Spanish-speaking children to exhibit some effects of word length and/or prosodic licensing in their early use of articles. Since Spanish contains many words that are disyllabic feet, we might expect young Spanish-speaking children to show evidence of disyllabic feet in their early utterances.

Lleó (2002, 2006), in a study of the prosodic word structures of three Spanish-speaking children, José, María, and Miguel, showed that this is the case. She further showed that disyllabic words with final stress (e.g., *pa*p*á* 'father') first appear between 1;4 and 1;6 years, and that trisyllabic wSw words with an initial unfooted syllable and medial stress (e.g., *mu*ñ*eca* 'doll') first appear between 1;3 and 1;6. Overall, she reported

that trisyllabic words are acquired relatively quickly, with only a very short period of truncation. This is much earlier than is typically reported for English (cf. Pater, 1997). Larger quadrisyllabic words are acquired a bit later, at 1;10 by José and María and only at 2;2 by Miguel.

Lleó (2003, 2006) then proceeded to examine these children's first use of articles. She found that two of the children (José and María) started to use articles with both di- and trisyllabic words at 1;10. She also noted that the child Miguel produced some disyllabic articles by as early as 1;5 (e.g., u*na* va*ca* 'the cow'). Note that u*na* is both a foot and a PW of its own. Lleó therefore suggested that this child prosodified his early *disyllabic* articles at the level of the PP (5a) before he began to produce *monosyllabic* articles at the same level of structure (5b). In contrast, the monosyllabic articles in structures like that in (5b) violate exhaustivity constraints on prosodic well-formedness, and may therefore be acquired later (Harris, 1983; see also Eddington, 2004, for a review of Spanish prosodic structure).

Lleó's (2003, 2006) study was one of the first to examine grammatical–lexical interactions in Spanish, where individual differences showed the article variably prosodified at either the level of the PW or the PP. However, the results indicated only when these children's first instances of certain structures begin (based on two correct productions), rather than providing a quantitative picture of development over time. The goal of the present study was therefore to provide a quantitative, longitudinal analysis of two Spanish-speaking children's development of articles, and how this interacts with the prosodic structure of the following noun. We hypothesized that, as in English and French, Spanish-speaking children's earliest articles would appear in unmarked prosodic contexts, but that the constraints on children's early prosodic representations would be larger than a disyllabic foot. Specifically, we expected Spanish-speaking children to produce monosyllabic articles with disyllabic words from the onset of article production. Given the relative prevalence of longer nouns in Spanish, we also expected that the acquisition of articles with three- and four-syllable words would take place relatively rapidly. Throughout the discussion we remain agnostic, however, as to the level at which monosyllabic articles are prosodified: this could be at the level of either the PW (5d) or the PP (5b). Further research, perhaps of an experimental nature, will be needed to shed more light on this issue.

2. Method

2.1 Participants

Two corpora of monolingual Spanish-speaking children from Spain (Irene, 1;4–2;1; Emilio, 1;6–2;5), were selected for the study from the CHILDES database (MacWhinney, 2000). These two corpora were chosen because they were the only ones available with sufficient data within the relevant age range. Irene, the only monolingual Spanish-speaking child from the Llinas/Ojea Corpus, was recorded approximately twice a month during interactions with her parents. Emilio, a Spanish-speaking child from the Vila Corpus, was recorded once or twice a month. The children's ages and corresponding mean length of utterance (MLU) in morphemes are provided in Table 1. Irene was precocious, with an MLU of 3 at the age of 1;8, whereas Emilio was much slower to develop, with an MLU of only 1.7 at the same age.

Table 1. Participants' ages and MLU (in morphemes)

Age	Child and MLU (in morphemes)	
	Irene	Emilio
1;4	1.26	–
1;5	2.04	–
1;6	2.12	1.60
1;7	2.75	1.37
1;8	3.00	1.66
1;9	4.25	1.79
1;10	3.55	1.79
1;11	4.82	2.22
2;0	4.43	1.86
2;1	5.89	2.50
2;2	–	–
2;3	–	3.13
2;4	–	3.50
2;5	–	2.92

2.2 The data and coding procedures

In order to examine the prosodic development of nouns and articles, we first extracted from the database all nouns (e.g., *el oso* 'the bear') and nominal adjectives (e.g., *el grande* 'the big one') where an article was obligatory. To do this we identified the target orthography for each of the children's utterances in the transcription using the discourse context, the structure of Spanish, and the child's speech patterns (see Vihman & McCune, 1994, for discussion of similar procedures). Each noun was then coded for the target number of syllables, the target word stress pattern (not coded in the children's actual productions), and which syllables (if any) were omitted.

A list of the Spanish articles is provided in Table 2. Definite articles are obligatory in Spanish when naming specific objects (e.g., *el tenedor* 'the fork'), and with generic nouns (e.g., *la vida* 'life'; *la felicidad* 'happiness'; *¿Cómo son los perros?* 'What are dogs like?'). A definite article is also used with meals (e.g., *la cena* 'dinner'), time (e.g., *las dos* 'two o'clock'), days of the week (e.g., *el lunes* 'Monday'), abstract ideas (e.g., *la verdad* 'truth'), body parts (e.g., *la mano* 'hand' or 'my hand'), clothing (e.g., *la camisa* 'the shirt' or 'my shirt'), and when a specific person is being referred to (e.g., *la señora*

Table 2. Spanish articles

	Singular		Plural	
	Masculine	Feminine	Masculine	Feminine
Definite	el	la	los	las
Indefinite	un	una	unos	unas

'Mrs'). An indefinite article is used when the noun is non-specific (e.g., *un perro* 'a dog'). The plural indefinite articles, *unos* and *unas*, are used in the same context as 'some' (e.g., *unas muñecas* 'some dolls'). An article is not required with an undetermined amount (e.g., *Quiero agua* 'I want water'; *Tiene estrellas* 'It has stars'), or with the expressions *otro/otra* (e.g., *otro caballo* 'another horse') or *que* (e.g., *¡Qué problema!* 'What a problem!'), or with any other determiner in general (e.g., *este* 'this'; *mi* 'my,' etc.). Articles are not required when a person (or personified entity) is being addressed (e.g., *¡hola video!* 'hello video!') (King, 1992).

We excluded from our analysis any items that were not clear. A few of the children's nominal uses were ambiguous as to context, making it impossible to determine if an article was required (81 tokens for Irene, 30 tokens for Emilio). These included single word contextless exclamations (e.g., *¡oveja!* 'sheep!'), noun phrases that could possibly but not necessarily be a name (e.g., *papa oso* 'papa bear'), or instances where the presence of a filler syllable was unclear. Examples of the latter include *abeza* target: *(la) cabeza* '(the) head,' which is either a single word missing an onset or a truncated noun with a filler syllable article. We also excluded from the analysis any songs, English words, and repetitions (e.g., the latter two tokens in *la luna luna luna* 'the moon moon moon').

The specific article required was determined by the properties of the noun and the discourse context. Each article was coded for gender, number, definiteness, target number of syllables, and number of syllables produced. A distinction was made between articles that were produced target-like and those produced as filler syllables. Articles that were realized as filler syllables (e.g., *e* for *el*, *a* for *la*) were coded as fillers (though both full articles and fillers were included in the analysis of articles). There were several cases where the child would produce a filler syllable with a noun but then immediately correct himself or herself with the full article (e.g., *(l)a boca, la boca* 'the mouth'). Such repetitions were counted only once according to our procedures, so we coded these articles as fully produced, showing that the child could produce the correct form but simply had a false start. The total number of target article contexts (once articles began to be produced) was 1166 for Irene and 267 for Emilio.

3. Results

3.1 The emergence of early articles in Spanish

Overall, Irene produced a total of 827 articles, constituting 70% of the contexts where an article was required. Emilio, who was slower to develop, produced a total of 160 articles, constituting 60% of obligatory contexts. This is shown in Tables 3 and 4, respectively. Irene's first articles appeared at 1;5 (MLU 2.04), but increased dramatically at 1;7 (MLU 2.75). Emilio first exhibited significant use of determiners at 2;1 (MLU 2.50). Thus, for both children, there was a significant increase in the use of articles at the onset of multiword utterances, similar to what has been found in English and French. This suggests that, at this point in development, they had acquired at least some of the syntactic and semantic knowledge required to produce articles in obligatory contexts.

Table 3. Irene's number (%) of monosyllabic and disyllabic articles produced in obligatory contexts

Age	Production of target articles		
	Monosyllabic	Disyllabic	Total
1;5	1/88 (1)	0/1 (0)	1/89 (1)
1;6	6/65 (9)	1/3 (33)	7/68 (10)
1;7	136/203 (67)	32/47 (68)	168/250 (67)
1;8	108/139 (78)	11/13 (85)	119/152 (78)
1;9	87/109 (80)	42/43 (98)	129/152 (85)
1;10	50/58 (86)	3/3 (100)	53/61 (87)
1;11	122/143 (85)	31/34 (91)	153/177 (86)
2;0	93/108 (86)	20/23 (87)	113/131 (86)
2;1	69/70 (99)	15/16 (94)	84/86 (98)

Table 4. Emilio's number (%) of monosyllabic and disyllabic articles produced in obligatory contexts

Age	Production of target articles		
	Monosyllabic	Disyllabic	Total
1;11	2/43 (5)	0/2 (0)	2/45 (4)
2;0	1/20 (5)	0/1 (0)	1/21 (5)
2;1	11/28 (39)	2/5 (40)	13/33 (39)
2;3	15/34 (44)	0/2 (0)	15/36 (42)
2;4	75/76 (99)	2/2 (100)	77/78 (99)
2;5	36/37 (97)	16/17 (94)	52/54 (96)

However, both children's use of articles continued to be variable for several months. If the pattern of article development in Spanish is similar to that found for both English and French, it is likely that this period of variable article use is due to phonological constraints on prosodic structure. That is, some of children's variable production of articles may be conditioned by the prosodic complexity of the following noun. Specifically, we predicted that the children's production of articles would be adversely affected by the increasing number of syllables in the noun. Due to the larger prosodic structure of the Spanish lexicon, we also expected that they would show earlier production of articles in unfooted/trisyllabic contexts than their English- and French-speaking peers.

3.2 Articles as 'filler syllables'

Previous studies of early article use have noted the early use of 'filler syllables' (cf. Peters, 1983; Peters & Menn, 1993; Veneziano & Sinclair, 2000), or phonologically underspecified 'proto-articles' (Lleó, 1998; see also Goad & Buckley, 2006). Irene exhibited some use of fillers, especially between the ages of 1;7 and 1;9, when many articles were truncated to single vowels (e.g., *el* > *e, la* > *a, un* > *u*). Irene also truncated

Table 5. Irene's number (%) of full vs. filler articles produced

Age	Article type	
	Full	Filler
1;5	0/1 (0)	1/1 (100)
1;6	6/7 (86)	1/7 (14)
1;7	83/168 (49)	85/168 (51)
1;8	32/119 (27)	87/119 (73)
1;9	77/129 (60)	52/129 (40)
1;10	41/53 (77)	12/53 (23)
1;11	139/153 (91)	14/153 (9)
2;0	107/113 (95)	6/113 (5)
2;1	82/84 (98)	2/84 (2)

Table 6. Emilio's number (%) of full vs. filler articles produced

Age	Article type	
	Full	Filler
1;11	2/2 (100)	0/2 (0)
2;0	1/1 (100)	0/1 (0)
2;1	12/13 (92)	1/13 (8)
2;3	13/15 (87)	2/15 (13)
2;4	76/77 (99)	1/77 (1)
2;5	52/52 (100)	0/52 (0)

seven disyllabic articles between the ages of 1;7 and 1;9. All were target u*na* truncated to *a*, and all occurred with non-truncated nouns (five with disyllabic nouns, and two with trisyllabic nouns). In contrast, Emilio produced almost all articles in full form. Tables 5 and 6 provide an overview of Irene's and Emilio's full vs. filler articles, respectively.

We assume that, even in reduced form, these children have some access to the syntax and semantics of articles. That is, even in reduced form it was often possible to recover the child's intended article, though it is difficult to know how much of the semantics of definiteness they know using corpus data (see Maratsos, 1976, for discussion). Both children began to use definite and indefinite articles around the same time. A comparison of the masculine singular definite *el* and indefinite *un* articles is useful for comparison, since this is the only pair where both are monosyllabic. Irene had more target definite compared to indefinite masculine singular articles (248 vs. 171), but the production rate was the same (75% vs. 73%). Emilio had many fewer masculine singular articles overall, but most were again definite rather than indefinite (113 vs. 86). However, his production of the definite articles was lower than that for indefinites (27% vs. 84%), possibly due to a large number of indefinite articles produced at 2;4 (a recording session with lots of object identification). We now turn to an examination of the children's noun truncation, and then look at the interactions between article and nominal form.

3.3 Noun truncation

Given prior findings on the acquisition of Spanish (Demuth, 2001; Lleó, 2002, 2006), we expected that the children in this study would have no problem producing disyllabic target words with the correct number of syllables. On the other hand, we expected some truncation of longer three- and four-syllable words. The results showed that this was especially the case for Irene, who truncated most of her three-syllable words to two syllables until 1;7. Some of her four-syllable nouns were also truncated to two syllables at the earlier ages (including 20 separate examples of *zapatilla* > pilla 'shoe' at 1;8), and several are still truncated to three syllables at 2;1. This is shown in Table 7 (note the two types of truncations for four-syllable nouns). In contrast, Emilio only truncated once in the context of an article, a four- to two-syllable truncation at 1;8, though he truncated frequently before he started producing articles. Thus, whereas Irene truncates the lexical item to include the article, Emilio prefers not to truncate, at the cost of omitting the article. Despite these individual differences, both show upper bounds on prosodic structure, permitting three- and then four- and five-syllable structures in rapid succession. Both children targeted few five-syllable words overall once they began to use articles systematically (Irene: 7; Emilio: 6), making it difficult to draw generalizations about when they permit six syllable structures.

Most of Irene's truncated three-syllable words contained penultimate stress, where the initial unstressed syllable was omitted (e.g., *muñecos* > quecos 'dolls'). A few with final stress had the initial syllable omitted (e.g., *conejín* > *titin* 'rabbit'), and a few with antepenultimate stress had the medial syllable omitted (e.g., pájaro > paro 'bird'). Similar results were found for four-syllable word truncation, where most of Irene's truncated four-syllable words contained penultimate stress with the second syllable (and sometimes the first) omitted (e.g., *zapatilla* > pilla 'shoe'). Illustrative examples, as well as productions with and without articles, are provided in Appendices A and B.

Table 7. Irene's number (%) of truncated three- and four-syllable nouns used in the context of an article

Age	Truncation pattern		
	3 to 2 syllables	4 to 2 syllables	4 to 3 syllables
1;5	31/34 (91)	0/2 (0)	1/2 (50)
1;6	16/18 (89)	0/1 (0)	0/1 (0)
1;7	24/68 (35)	2/2 (100)	0/2 (0)
1;8	15/29 (52)	20/20 (100)	0/20 (0)
1;9	6/37 (16)	0/2 (0)	1/2 (50)
1;10	2/17 (12)	1/6 (17)	4/6 (67)
1;11	2/56 (4)	0/13 (0)	0/13 (0)
2;0	0/34 (0)	0/14 (0)	1/14 (7)
2;1	0/16 (0)	0/27 (0)	5/27 (19)

3.4 Interactions between article production and word truncation

The Prosodic Licensing Hypothesis proposes that children will begin to produce grammatical morphemes once some syntactic/semantic knowledge of the morpheme is in place *and* the prosodic structure needed to license them is available. It is therefore necessary to examine children's use of articles as a function of the number of syllables in the following noun. To address this question, we examined the use of articles as a function of the number of syllables in the noun that were actually produced. In conducting these analyses, we examined the time period starting from when children first showed the variable use of articles. This included that middle 1;7 session (MLU 2.75) for Irene and the later 2;1 session (MLU 2.50) for Emilio. This ensured that the children had at least some of the syntactic and semantic knowledge required to use articles. Since monosyllabic and disyllabic articles have different prosodic structures (disyllabic articles are separate PWs (5a)), we analyzed them separately.

3.4.1 Monosyllabic articles. We first examined whether the actual number of syllables *produced* in the following noun was a factor contributing to the children's article production. If children's production of articles is constrained by prosody, it should be negatively affected by the increasing number of syllables in the noun. We therefore conducted a logistic regression analysis where the independent variable was the number of syllables produced in the noun. The dependent variable was whether the article was produced or not. As predicted, children's ability to produce articles significantly decreased as the number of syllables produced in the following noun increased: Irene: *coefficient B* = –0.315, *SE of B* = 0.143, $z = -2.21$, $p = 0.027$; Emilio: *coefficient B* = –0.714, *SE of B* = 0.257, $z = -2.78$, $p = 0.005$. This is shown in Tables 8 and 9, respectively.

The logistic analysis above shows the general trends in *% article produced* across all nouns and ages, but it does not tell us exactly where the effect comes from. We thus performed chi-square tests month by month to compare *% article produced* between nouns with different numbers of produced syllables. The results showed that Irene's production of articles at 1;7 was significantly better when they were followed by two-syllable nouns

Table 8. Irene's number (%) of monosyllabic articles produced as a function of number of syllables produced in the following noun

Age	Number of syllables produced in the following noun				
	1	2	3	4	5
1;7	8/10 (80)	114/128 (89)	4/8 (50)	–	–
1;8	7/8 (88)	92/120 (77)	9/11 (82)	–	–
1;9	7/8 (88)	60/76 (79)	19/23 (83)	1/2 (50)	–
1;10	7/7 (100)	26/29 (90)	16/21 (76)	1/1 (100)	–
1;11	6/6 (100)	74/85 (87)	36/40 (90)	4/7 (57)	2/5 (40)
2;0	1/1 (100)	67/74 (91)	20/27 (74)	5/6 (83)	–
2;1	5/5 (100)	27/27 (100)	21/21 (100)	16/17 (94)	–
Total	41/45 (91)	460/539 (85)	125/151 (83)	27/33 (82)	2/5 (40)

Table 9. Emilio's number (%) of monosyllabic articles produced as a function of number of syllables produced in the following noun

Age	Number of syllables produced in the following noun				
	1	2	3	4	5
2;1	–	8/12 (67)	3/15 (20)	0/1 (0)	–
2;3	1/1 (100)	8/15 (53)	5/16 (31)	1/2 (50)	–
2;4	9/9 (100)	36/36 (100)	28/29 (97)	2/2 (100)	–
2;5	6/6 (100)	13/13 (100)	15/16 (94)	–	1/1 (100)

than three-syllable nouns (89% vs. 50%), $\chi^2 = 10$, $df = 1$, $p < 0.01$. Similarly, Emilio produced articles significantly better with two-syllable nouns than three-syllable nouns at 2;1 (67% vs. 20%), $\chi^2 = 6.01$, $df = 1$, $p = 0.01$. All other pairs were not significantly different from each other. Thus, at the onset of article use, both children were more likely to use articles with one- and two-syllable nouns (or truncated three- and four-syllable nouns) than with a larger prosodic word, but this rapidly changed to include larger structures.

By 1;11, Irene's truncation of the following noun was significantly reduced as her use of articles remained above 80%. Thus, much of the variability in Irene's early production of articles was determined by her alternation between producing the full noun vs. a truncated noun plus article (e.g., *un conejin* > *un titin* 'a rabbit' vs. *el dinero* > *dinero* 'the money'). In contrast, Emilio never truncated nouns. Rather, he acquired full lexical structure (all syllables in the noun) before the onset of article use. Nonetheless, his use of articles was conditioned as function of nominal length.

In sum, both Irene and Emilio's production of monosyllabic articles was significantly affected by the number of syllables they produced in the following noun. This suggests that their use of this grammatical morpheme is prosodically constrained to occur in the context of a simply disyllabic PW plus an unfooted syllable. We suggest that the initially three-syllable window is best construed as an affixal clitic (5d) (*la mesa* 'the table'). Articles then begin to be more consistently produced with larger three-syllable words one month later (*la muñeca* 'the doll'). At this point they could have a larger, trisyllabic PW with an affixal clitic (5d), or may have moved on to have a free clitic analysis of articles (5b), similar to that of adults. Possible support for the latter analysis comes from the fact that we found no significant difference in children's production of articles with three- and four-syllable words, at any point in time. Thus, if the structure in (5b) is available, it could in theory be used.

These findings are in keeping with the Prosodic Licensing Hypothesis, which suggests that much of the variability in early grammatical morpheme production is due to prosodic, rather than syntactic constraints. Interestingly, these constraints disappear quickly in Spanish; Spanish article production rates three months after the onset of article production were at least 80% in all contexts. This differs from the article acquisition patterns found for French and English: French-speaking children reached over 80% article production with disyllabic words only 10 months after the onset of article production (Demuth & Tremblay, 2008). Although English-speaking children produced over 80% of articles in footed contexts three months after articles begin to appear, articles in the more

challenging unfooted contexts (such as *the dolly*) are produced at a rate of only 13–32% (Demuth & McCullough, 2009). Thus, although the onset of article production is around 1;7 across languages (albeit with some individual variation), the rates of article production in different prosodic contexts vary systematically with the prosodic structure of the language. The more rapid acquisition of articles in Spanish is probably due to the fact that words in the Spanish lexicon are longer than those in the other two languages, providing Spanish learners with the opportunity to expand their prosodic grammar much earlier than learners of languages like English and French.

We turn now to an examination of these children's production of *disyllabic* articles. Recall that these are prosodified at the higher level of the PP, and appear to be learned relatively early. On one hand, we might expect an interaction with the number of syllables in the following noun, with a preference for two sets of disyllabic feet. If so, we would expect a difference in children's production of disyllabic articles with two- and three-syllable words. On the other hand, since disyllabic articles constitute a foot and an independent PW (5a), they do not violate any exhaustivity constraints. Thus, it is possible that there will be no interaction between the use of the disyllabic articles and the prosodic complexity of the following lexical form.

3.4.2 Disyllabic articles. Using the same methods employed for monosyllabic articles, we examined whether the children's production of *disyllabic* articles was affected by the number of syllables produced in the noun. Both children also had fewer disyllabic articles at each age compared to monosyllabic articles. This is shown in Tables 10 and 11, respectively. Since Emilio had only 22 disyllabic articles, we concentrate further analysis on Irene, who had 176 tokens.

A logistic regression analysis showed that there was no effect of following word length on Irene's production of disyllabic articles: *coefficient B* = 0.193, *SE of B* = 0.316, $z = 0.61$, $p = 0.54$. Further analysis conducted pair-wise comparisons at each month of age once articles started to be produced. Again, the results showed that none of the pairs of *% article produced* significantly differed as a function of noun length in the case of disyllabic articles. For example, Irene's *% article produced* for the two- and three-syllable nouns at 1;7 were not significantly different, 68% vs. 79%, $\chi^2 = 0.55$, $df = 1$, $p = 0.46$.

Table 10. Irene's number (%) of disyllabic articles produced as a function of number of syllables produced in the following noun

Age	Number of syllables produced in the following noun				
	1	2	3	4	5
1;7	–	21/31 (68)	11/14 (79)	–	–
1;8	–	8/10 (80)	3/3 (100)	–	–
1;9	1/1 (100)	31/32 (97)	10/10 (100)	–	–
1;10	1/1 (100)	2/2 (100)	–	–	–
1;11	3/3 (100)	9/10 (90)	12/14 (86)	7/7 (100)	–
2;0	–	6/7 (86)	7/8 (88)	7/7 (100)	0/1 (0)
2;1	–	10/11 (91)	–	5/5 (100)	–

Table 11. Emilio's number (%) of disyllabic articles produced as a function of number of syllables produced in the following noun

Age	Number of syllables produced in the following noun				
	1	2	3	4	5
2;1	1/1 (100)	1/1 (100)	0/2 (0)	0/1 (0)	–
2;3	–	0/2 (0)	–	–	–
2;4	–	–	2/2 (100)	–	–
2;5	1/1 (100)	5/6 (83)	6/6 (100)	–	–

Thus, unlike with monosyllabic articles, Irene's production of disyllabic articles did not interact with the number of syllables produced in the following noun. We suspect that this is due to the status of disyllabic articles as independent PWs that are prosodified at the level of the PP, with no violation of prosodic constraints. This would concur with Lleó's (2006) reports that at least some children exhibit very early use of disyllabic articles.

Overall, there was no difference in *% article produced* between monosyllabic and disyllabic articles once articles began to be produced for Irene (1;7–2;1): 85% vs. 87%, $\chi^2 = 0.59$, $df = 1$, $p = 0.44$). We also compared *% monosyllabic article produced* and *% disyllabic article produced* month-by-month as a function of the number of syllables produced in the following noun. At 1;7, Irene produced monosyllabic articles better than disyllabic articles when they were followed by two-syllable nouns, 83% vs. 68%, $\chi^2 = 8.85$, $df = 1$, $p < 0.001$. On the other hand, at 1;9, her production of disyllabic articles was better than her production of monosyllabic articles when they were followed by two-syllable nouns, 79% vs. 97%, $\chi^2 = 5.46$, $df = 1$, $p = 0.02$. All other pairs were not significantly different from each other.

In sum, both children exhibited length effects for monosyllabic articles, producing them more consistently with nouns of fewer syllables. In addition, Irene exhibited significantly better production of articles with two- as opposed to three-syllable nouns at the initial stages of article acquisition. In contrast, she showed no systematic effects of following context for disyllabic articles. This was predicted due to their status as independent PWs. These findings therefore provide further support for the notion that children's grammatical morphemes will first appear in phonologically simpler, prosodically licensed contexts. This presupposes, however, that early articles are not merely prosodic placeholders, but that children have some knowledge of some of the syntax and semantics of articles when these begin to be used. Some support for this comes from the fact that articles begin to appear around the same time across languages, regardless of how they are prosodified. In the case of Spanish, children's prosodic competence has already expanded beyond a binary foot by the time they have the syntactic and semantic prerequisites needed to produce articles. This then facilitates the early and rapid use of articles across a wider range of prosodic contexts than that found for English and French at the same ages, where lexical truncation and omission of prosodically challenging articles persists for several more months.

4. Discussion

One of the goals of this study was to determine when the syntactic/semantic knowledge for the use of articles appears in Spanish. Lleó (2006) had shown that this occurred around the age of 1;10 for two of the children in her study, though the use of a disyllabic article was noted for one child at 1;5. The present study similarly found that articles begin to systematically appear at 1;7 for Irene and at 2;1 for slower-developing Emilio. For both children, this was at an MLU of 2.5. This is within the range of article use also reported for English and French, suggesting that access to some of the syntax and semantics of articles may occur across languages at around this time. The fact that article development is also closely aligned with MLU further suggests that it is linked to developments in syntactic knowledge. This is quite clearly seen in the case of Spanish, which exhibits the very rapid increase in article use once these begin to appear.

Another goal of this study was to examine the nature of the variability in article production, and if, as in English and French, this was due to phonological factors. In particular, it was predicted that, due to the high frequency of three-syllable words in Spanish, the children would permit early articles with both one- and two-syllable nouns. In contrast, it was predicted that their reliable use of articles with three- and four-syllable nouns would take longer to achieve. This was found to be (fleetingly) the case: unlike their English- and French-speaking peers, the Spanish-speaking children showed no difference in the use of articles with one- and two-syllable words. That is, they easily produce an article as an unfooted syllable at the earliest stage of article production. In addition, we expected to see an overall effect of word length, with articles being less likely to be used as the number of syllables in the following noun increased. This was also confirmed. Thus, although articles are acquired quite rapidly in Spanish once the grammatical capability is present, monosyllabic articles are more likely to be used in obligatory contexts with shorter or truncated words. This suggests that they can initially license monosyllabic articles as an unfooted syllable at the level of the PW (5d), but then are rapidly able to prosodify them at higher levels of the PP (5b).

There are two possible explanations for this finding, both due to the language-specific prosodic characteristics of the lexicon. First, unfooted syllables occur in 28% of Spanish words, and four-syllable words constitute about 15% of the Spanish vocabulary young children hear, significantly more than in English or French (Roark & Demuth, 2000). This means that Spanish-speaking children are much more likely to attempt three- and four-syllable words before the age of 2. Notably, Emilio stopped truncating four-syllable lexical items such as *caramelos* ‘candy’ and *mariposa* ‘butterfly’ at 1;10, before he attempted his first articles. Thus, in order to produce simple lexical items, Spanish-speaking children must be able to produce complex PWs that contain at least one unfooted syllable (or in the case of a four-syllable word, two feet). This influence from the lexicon may therefore encourage the early growth of more complex prosodic structures, compared to languages such as English and French where most of the lexicon children use contains one- and two-syllable words. Secondly, approximately 10% of the articles the children attempted in this study were disyllabic. Disyllabic articles in Spanish are already composed of a foot/PW, and must be prosodified at the higher level of the PP (5a). Given that this option is already available in their grammars (Lleó, 2006), the shift

to prosodifying monosyllabic articles at the level of the PP as well (5b) does not require a major expansion of prosodic structure. For some children (such as Emilio) it appears that the lexicon may drive the expansion of prosodic structure, whereas for others (such as Irene) it appears that the larger article + noun is treated as a prosodic unit. It is possible that Emilio's strategy will be more commonly found for slower developing children, where the lexicon expands prior to the development of syntax. In contrast, it is possible that Irene's pattern of development, with interactions between grammatical and lexical form, will be more typical of Spanish-speaking children in general. Despite these individual differences, both children exhibit the prosodic licensing of monosyllabic articles, prosodifying them first at the level of the PW, and then rapidly permitting prosodification at the level of the PP.

5. Conclusion

The goal of this article was to assess the possibility that Spanish-speaking children would produce articles in prosodically simpler contexts first, as predicted by the Prosodic Licensing Hypothesis. In addition, it was expected that children's first articles would appear in prosodic structures larger than a disyllabic foot, since the Spanish lexicon has many three-syllable words. Longitudinal spontaneous production data from two Spanish-speaking children between the ages of 1;4 and 2;5 provided support for both positions. It also found individual differences, with one child expanding prosodic structure at the level of the lexicon first, and the other permitting article production with truncated nouns. Despite these differences, both children began to use articles abruptly at an MLU of 2.5, suggesting that they had acquired some of the syntactic/semantic knowledge of articles at this point, and that much of the subsequent variable production of articles was therefore due to prosodic constraints. This was confirmed by the fact that both children showed an interaction between article use and the number of syllables in the following noun. Overall, they also acquired articles very quickly, suggesting that grammatical morphemes can be prosodically licensed very rapidly in languages where the lexicon is prosodically more complex. These findings therefore provide an important addition to the literature, providing a better understanding of how the prosodic characteristics of the lexicon may influence the overall development of prosodic structure as well as the early licensing of grammatical form.

Acknowledgments and funding

This research was funded in part by grant #R01 HD057606 to the first author. We thank Karen Evans, Glenda Molina, Sara Weschler and the Child Language Lab at Brown University for comments and suggestions.

References

Berko, J. (1958). The child's learning of English morphology. *Word*, *14*, 150–177.

Brown, R. (1973). *A first language: The early stages*. Cambridge, MA: Harvard University Press.

Bloom, L., Lifter, K., & Hafitz, J. (1980). The semantics of verbs and the development of verb inflections in child language. *Language*, *56*, 386–412.

Connelly, M. (1984). *Basotho children's acquisition of noun morphology*. Unpublished PhD thesis, University of Essex.

Davis, L., & MacNeilage, P. (1995). The articulatory basis of babbling. *Journal of Speech and Hearing Research*, *38*, 1199–1211.

Demuth, K. (1995). Markedness and the development of prosodic structure. In J. Beckman (Ed.), *Proceedings of the North Eastern Linguistic Society*, *25* (pp. 13–25). Amherst, MA: GLSA, University of Massachusetts.

Demuth, K. (1996). The prosodic structure of early words. In J. Morgan & K. Demuth (Eds.), *Signal to syntax: Bootstrapping from speech to grammar in early acquisition* (pp. 171–184). Mahwah, NJ: Lawrence Erlbaum.

Demuth, K. (2001). Prosodic constraints on morphological development. In J. Weissenborn & B. Höhle (Eds.), *Approaches to bootstrapping: Phonological, syntactic and neurophysiological aspects of early language acquisition*. Language acquisition and language disorders series, 24 (pp. 3–21). Amsterdam: John Benjamins.

Demuth, K., & Ellis, D. (2009). Revisiting the acquisition of Sesotho noun class prefixes. In J. Guo, E. Lieven, N. Budwig, S. Ervin-Tripp, K. Nakamura & S. Ozçalikan (Eds.), *Crosslinguistic approaches to the psychology of language: Festschrift for Dan Slobin* (pp. 93–104). Hillsdale, NJ: Lawrence Erlbaum.

Demuth, K., & Johnson, M. (2003). Truncation to submiminal words in early French. *Canadian Journal of Linguistics*, *48*, 211–241.

Demuth, K., & McCullough, E. (2009). The prosodic (re)organization of children's early English articles. *Journal of Child Language*, *36*, 173–200.

Demuth, K., & Tremblay, A. (2008). Prosodically-conditioned variability in children's production of French determiners. *Journal of Child Language*, *35*, 99–127.

Eddington, D. (2004). *Spanish phonology and morphology: Experimental and quantitative perspectives*. Amsterdam: John Benjamins.

Fikkert, P. (1994). *On the acquisition of prosodic structure*. PhD dissertation, HIL dissertations 6, Leiden University. The Hague: Holland Academic Graphics.

Gerken, L. A. (1991). The metrical basis of children's subjectless sentences. *Journal of Memory and Language*, *30*, 431–451.

Gerken, L. A. (1994a). A metrical template account of children's weak syllable omissions from multisyllabic words. *Journal of Child Language*, *21*, 565–584.

Gerken, L. A. (1994b). Young children's representations of prosodic structure: Evidence from English-speakers' weak syllable productions. *Journal of Memory and Language*, *33*, 19–38.

Gerken, L. A. (1996). Prosodic structure in young children's language production. *Language*, *72*, 683–712.

Gerken, L. A., & McIntosh, B. (1993). The interplay of function morphemes and prosody in early language. *Developmental Psychology*, *29*, 448–457.

Gleitman, L., Gleitman, H., Landau, B., & Wanner, E. (1988). Where learning begins: Initial representations for language learning. In F. J. Newmeyer (Ed.), *Linguistics: The Cambridge survey, vol. 3. Language: Psychological and biological aspects* (pp. 150–193). New York: Cambridge University Press.

Goad, H., & Buckley, M. (2006). Prosodic structure in child French: Evidence for the foot. In A. Gavarró & C. Lleó (Eds.), *Catalan Journal of Linguistics 5, Acquisition of romance languages* (pp. 109–142). Bellaterra: Universitat Autònoma de Barcelona.

Harris, J. (1983) *Syllable structure and stress in Spanish: A nonlinear analysis*. Cambridge, MA: MIT Press.

Hyams, N. (2007). Aspectual effects on interpretation in early grammar. *Language Acquisition*, *14*, 231–268.

King, L. D. (1992). *The semantic structure of Spanish: Meaning and grammatical form*. Philadelphia, PA: John Benjamins.

Levelt, C., Schiller, N., & Levelt, W. (2000). The acquisition of syllable types. *Language Acquisition*, *8*, 237–264.

Lleó, C. (1996). To spread or not to spread: Different styles in the acquisition of Spanish phonology. In B. Bernhardt, J. Gilbert & D. Ingram (Eds.), *Proceedings of the UBC International Conference on Phonological Acquisition* (pp. 215–228). Somerville, MA: Cascadilla Press.

Lleó, C. (1998). Proto-articles in the acquisition of Spanish: Interface between phonology and morphology. In R. Fabri, A. Ortmann & T. Parodi (Eds.), *Modelle der Flexion: 18. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft* (pp. 175–195). Tübingen: Niemeyer Verlag.

Lleó, C. (2002). The role of markedness in the acquisition of complex prosodic structures by German–Spanish bilinguals. *International Journal of Bilingualism*, *6*, 291–313.

Lleó, C. (2003). Child prosody and filler syllables: Looking into Spanish through the optimal window of acquisition. In S. Montrul & F. Ordóñez (Eds.), *Linguistic theory and language development in Hispanic languages: Papers from the 5th Hispanic Linguistics Symposium and the 4th Conference on the Acquisition of Spanish and Portuguese* (pp. 229–253). Somerville, MA: Cascadilla Press.

Lleó, C. (2006). The acquisition of prosodic word structures in Spanish by monolingual and Spanish–German bilingual children. *Language and Speech*, *49*, 205–229.

MacNeilage, P. (1998). Nasalization of vowels in nasal environments in babbling: Evidence for frame dominance. *Phonetica*, *55*, 1–17.

MacWhinney, B. (2000). *The CHILDES project: Tools for analyzing talk*, 3rd edn. Mahwah, NJ: Lawrence Erlbaum.

Maratsos, M. P. (1976). *The use of definite and indefinite reference in young children*. Cambridge: Cambridge University Press.

Marshall, C. R., & van der Lely, H. K. J. (2007). The impact of phonological complexity on past tense inflection in children with grammatical-SLI. *Advances in Speech-Language Pathology*, *9*, 191–203.

Nespor, M., & Vogel, I. (1986). *Prosodic phonology*. Dordrecht: Foris.

Pater, J. (1997). Minimal violation and phonological development. *Language Acquisition*, *6*, 201–253.

Peters, A. (1983). *The units of language acquisition*. Cambridge, MA: Cambridge University Press.

Peters, A., & Menn, L. (1993). False starts and filler syllables: Ways to learn grammatical morphemes. *Language*, *69*, 742–777.

Prince, A., & Smolensky, P. (2004). *Optimality theory: Constraint interaction in generative grammar*. Oxford: Blackwell.

Radford, A. (1990). *Phonology and syntax: The relation between sound and structure.*Cambridge, MA: MIT Press.

Roark, B., & Demuth, K. (2000). Prosodic constraints and the learner's environment: A corpus study. In S. C. Howell, S. A. Fish & T. Keith-Lucas (Eds.), *Proceedings of the 24th Annual Boston University Conference on Language Development* (pp. 597–608). Somerville, MA: Cascadilla Press.

Selkirk, E. (1984). *Phonology and syntax: The relation between sound and structure*. Cambridge, MA: MIT Press.

Selkirk, E. (1996). The prosodic structure of function words. In J. Morgan & K. Demuth (Eds.), *Signal to syntax: Bootstrapping from speech to grammar in early acquisition* (pp. 187–213). Mahwah, NJ: Lawrence Erlbaum.

Song, J. Y., Sundara, M., & Demuth, K. (2009). Phonological constraints on children's production of English third person singular *–s*. *Journal of Speech, Language, and Hearing Research*, *52*, 623–642.

Veneziano, E., & Sinclair, H. (2000). The changing status of 'filler syllables' on the way to grammatical morphemes. *Journal of Child Language*, *27*, 461–500.

Vihman, M. M., & McCune, L. (1994). When is a word a word? *Journal of Child Language*, *21*, 517–542.

Wexler, K. (1994). Optional infinitives, head movement and the economy of derivations in child grammar. In D. Lightfood & N. Hornstein (Eds.), *Verb movement* (pp. 305–350). Cambridge, MA: Cambridge University Press.

Appendix A: Irene: Variability in article + noun productions (stressed syllable underlined)

(1) Three-syllable target nouns

a. Article and truncated noun

	Age	Child production	Target	Gloss
i.	1;7	una bola	una pistola	a pistol
ii.	1;7	un titin	un conejin	a rabbit
iii.	1;8	una pesa	una sorpresa	a surprise
iv.	1;8	(l)a beza	la cabeza	the head
v.	1;9	unos quecos	unos muñecos	some dolls

b. No article and full noun

i.	1;9	dinero		money
ii.	1;10	video		video
iii.	1;11	castillos		castles
iv.	1;11	pajarín		bird
v.	2;0	conejín		rabbit

c. Article and full noun

i.	1;10	un muñeco		a doll
ii.	1;11	un patito		a duck
iii.	1;11	el pajarín		the bird
iv.	1;11	un osito		a little bear
v.	1;11	las orejas		the ears

(2) Four-syllable target nouns

a. Article and truncated noun

	Age	Child production	Target	Gloss
i.	1;8	la pilla	la zapatilla	the shoe
ii.	1;10	u efante	un elefante	an elephant
iii.	1;10	los pasinos	los payasinos	the clowns

Appendix A: *(Continued)*

b. No article and full noun		
i. 1;9	orejita	ear
ii. 1;11	alpargatas	canvas sandals
iii. 1;11	elefante	elephant
iv. 2;1	servilleta	napkin
v. 2;1	caramelos	candy
c. Article and full noun		
i. 1;11	el teléfono	the telephone
ii. 1;11	una mariposa	a butterfly
iii. 2;0	una escalera	a staircase
iv. 2;1	la servilleta	the napkin

Appendix B: Emilio: Variability in article + noun productions (stressed syllable underlined)

(1) Three-syllable target nouns

a. No article and full noun

Age	Child production	Gloss
i. 1;10	caballo	horse
ii. 1;10	zapato	shoe
iii. 1;10	tortuga	turtle
iv. 1;10	pájaro	bird
v. 2;1	autobús	bus

c. Article and full noun

i. 2;1	un besito	a kiss
ii. 2;4	un caballo	a horse
iii. 2;4	una oveja	a sheep
iv. 2;4	la escuela	the school
v. 2;5	la tortuga	the turtle

(2) Four-syllable target nouns

a. No article and full noun

Age	Child production	Gloss
i. 1;10	mariposa	butterfly
ii. 1;11	mariquita	ladybug
iii. 2;0	caramelos	candy
iv. 2;3	pajarito	bird
v. 2;3	Cecilia	Cecilia

c. Article and full noun

i. 2;3	el almendro	the almond tree
ii. 2;4	un elefante	an elephant
iii. 2;5	los columpios	the swings