

Chapter 11

Stylistic patterns in the speech of young children and their caregivers: A study of variable /s/ lenition in Dominican Spanish

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Introduction

The study of how young children acquire sociolinguistic variation is essential for understanding language acquisition more generally. A fundamental question in language acquisition research is how children come to acquire properties of their target language based on *the input* to which they are exposed. In the case of bilingual language acquisition, the question of input quantity – how much exposure the child has to both languages – has been linked to acquisition timing and outcomes. Increased input quantity generally is associated with earlier acquisition and more target-like outcomes. In addition to examining the impact of input quantity on acquisition, the question of how input variability impacts acquisition has received attention more recently. Some studies have addressed this question with artificial language learning methods where the variability to which children are exposed can be controlled and modified. Other studies have focused on children’s acquisition of variable forms in different dialects of a language. In both cases, the findings suggest that variable forms take longer to acquire than non-variable forms – even in bilingual children; although increased input quantity to the variable forms results in more target-like acquisition of the probabilistic patterns of those forms. The present paper continues this line of research by investigating how children acquire variable /s/ lenition in Dominican Spanish.

Spanish syllable final /s/ lenition, illustrated in (1), has been described as a phonological process whereby coda /s/ is reduced to an aspiration [h] or is omitted. This process has been widely studied in various dialects of Spanish, although there are only a few large-scale studies on s-lenition in Dominican Spanish (see Bullock, Toribio, & Amengual, 2014).

	Pronunciation
(1) Las niñas fueron a la escuela	la[s] / la[h] / la
The-PL girls-PL went-PST-PL to the school	niña[s] / niña[h] / niña
‘The girls went to school’	e[s]cuela / e[h]cuela / ecuela

Studies on Spanish /s/ lenition have focused primarily on adult speech and indicate that various linguistic and extralinguistic factors constrain the lenition of final /s/ and that constraints are similar across the various dialects of Spanish. Less is known about how children come to acquire the various factors constraining /s/ lenition. In general, most sociolinguistic research has focused on adult speakers, and variable /s/ lenition is no exception. The current paper sets out to address the question of how children come to acquire the sociolinguistic factors constraining variable /s/ lenition. We address the following research questions.

1. Is children’s use of /s/ lenition constrained by the same linguistic factors that constrain adult usage?
2. Do different social contexts impact children’s lenition of syllable final [s]?

3. Is /s/ lenition in child-directed speech (by caregivers) similar to that found in adult-to-adult speech?

This paper is set up as follows: first, we review the previous literature on Spanish /s/ lenition and children's acquisition of sociolinguistic variation. Then, we present both corpus data and an experimental study that document children's (and their caregiver's) production of /s/ lenition. Finally, we discuss how the results address the three research questions presented above.

Spanish /s/ lenition

There are numerous studies on the social and linguistic factors that impact the variable articulation of coda /s/ by Spanish-speaking adults (Cepeda, 1995; File-Muriel & Brown, 2010; Lipski, 1984; Poplack, 1980; Terrell & Tranel, 1978). S-lenition, manifested as an aspiration or deletion, is found in most varieties of Spanish, including those varieties spoken in southern Spain, the Canary Islands, and throughout Latin America, with the exception of the Mexican highlands and the Andean regions of South America (Alba, 2000; Cepeda, 1995; File-Muriel & Brown, 2010; Lipski, 1994).

While most research on coda /s/ lenition has focused on the alternation of three variants: the full variant [s], the weakened variant [h], and the deleted variant [Ø], previous studies on /s/ lenition in Dominican Spanish have reported that the aspirated variant [h] is almost nonexistent and that the deleted form is, by far, the most frequently produced variant in adult speech (Bullock et al., 2014; Terrell, 1986; Terrell & Tranel, 1978). Terrell reports deletion rates of as high as 98% in some Dominican adult speakers and in Bullock et al. (2014) only 17 of their 3,498 coda /s/ tokens involved the aspirated variant among children and adults in conversational speech.

Various linguistic and social factors impact lenition of coda /s/. In Dominican Spanish, as well as in other varieties of Spanish, these factors include position within a word, following phonological context, morphological function, the speaker's gender, and speech style.

Word position and following phonological segment

Past studies have found an effect of word position and following phonological segment on coda /s/ lenition. Generally speaking, most studies have reported that coda /s/ occurring between words, as illustrated in (2), shows a higher rate of omissions than does word-medial position (illustrated in (3)), and that there is an increase in retention of the full variant [s] before a pause (illustrated in (4)) (Bullock et al., 2014; File-Muriel & Brown, 2010; Miller, 2013).

(2) las niñas
the-PL girl-PL
'the girls'

(3) escuela
'school'

(4) Hay vacas
Exst cow-PL
'There are cows'

Bullock et al. 2014 combined word position with phonological segment in order to provide a more precise picture of the impact of phonological context on coda /s/ lenition in Dominican Spanish. They found that adult Dominican Spanish-speakers retain the full variant [s] more often word internally when it occurs before nasals and voiceless stops (and less often word internally when it occurs before voiced approximants). When looking at coda /s/ lenition between words, they found that [s] was retained most often before vowels. They also found that [s] was retained more often

before pauses. The factor weights above .5 in Table 1 indicate the contexts that favor [s] retention in Dominican Spanish speakers.

Morphological function

Both the Spanish nominal plural marker and the 2nd singular marker are suffixes that are realized as /-s/. Spanish also has number agreement in the noun phrase, such that the plural marker occurs on all elements inside the noun phrase, as illustrated in (5).

- (5) a. Tienes diez dólares
 Have-2SG ten dollars
 ‘You have ten dollars’
 b. Unas jóvenes inteligentes
 Some-PL youth-PL intelligent-PL
 ‘Some intelligent youth’

Table 1. Coda [s] Retention in Dominican Spanish (Adapted from Bullock, Toribio, Amengual (2014)).

Position of Coda /s/	Proportion of [s] Retention	Factor Weight
Word Medial_Nasals	.500	.978
Word Medial_Voiceless Stops	.406	.847
Word Medial_Vowels	.323	.638
Pre-pausal	.238	.631
Word Medial_Fricatives	.100	.416
Word Final_Stops	.208	.333
Word Final_Voiced Approximants	.112	.319
Word Final_Liquids	.176	.301
Word Medial_Liquids	.126	.244
Word Medial_Voiced Approximants	.048	.237
Word Final_Fricatives	.147	.157

One question that has arisen is whether there are different rates of retention for morphological /-s/ v. nonmorphological (or lexical) /s/. A functional hypothesis might predict a higher rate of omissions of morphological /-s/, as number agreement is redundant information. This is consistent with Poplack (1980), who found that lexical /s/ was retained more often than morphological /-s/. At the same time, one might predict a higher retention of the plural marker /-s/ on at least one element inside the noun phrase, since the plural marker is meaning bearing. For adult speakers this does not seem to be the case. In Dominican Spanish, Terrell (1986) and Alba (2000) found that morphological status did not contribute to [s] retention in the speakers sampled. Miller (2013) also found that even though children retained plural marker /-s/ more often on nouns (~30%) than on determiners or adjectives, retention was not significantly higher than for lexical [s] (27%). As such, there seems to be some evidence suggesting that morphological /-s/, whether it be the second singular verbal affix or the nominal plural marker, will be retained less often than nonmorphological /s/.

Social constraints

The production of coda /s/ varies by different social contexts, including speech style, gender of the speaker, social class of the speaker, literacy of the speaker, and age. With respect to speech style, many studies have indicated that more formal contexts tend to be associated with more overt variants, and informal speech styles with more omissions. Fontanella de Weinberg (1974) investigated coda /s/ lenition in Argentine speakers while they produced speech in four different speaking styles (spontaneous speech, formal speech, reading, and word lists). She found that, regardless of social class background or educational level, the level of coda /s/ omissions increased as the task became less formal (i.e., spontaneous speech < formal speech < reading < word lists). Similar findings have been reported for Chilean adult speakers (Cepeda, 1995; Miller, 2007; Minnick Fox, 2006; Valdivieso & Magaña, 1991). However, for dialects of Spanish that have advanced levels of omission rates, speech style may have lesser of an impact. It has been noted that /s/ is omitted in almost all speech styles in Caribbean Spanish, and is retained only in the most formal of settings, such as in reading or formal speeches (Lipski, 1985; Minnick Fox, 2006; Terrell, 1977). As far as we know, there is no previous work examining the impact of speech style on Dominican Spanish-speaking children's production of coda /s/, or their production of coda /s/ within a school setting. Related to social class, Bullock et al. (2014) investigated the impact of literacy on coda /s/ retention in Dominican speakers. They found that literacy significantly impacted [s] retention, with literate speakers retaining [s] about 35% of the time and semi-literate speakers only retaining coda [s] about 15% of the time.

Numerous studies have also reported an effect of the speaker's gender on the retention/omission of coda /s/ in Spanish. Cepeda (1995) reported that adult Chilean males omit coda /s/ more often than adult females do. Similar findings for males and females have been reported for Dominican Spanish as well. Bullock et al. (2014) found that females retained coda /s/ about 36% of the time, while males did so only about 15% of the time.

Acquisition of sociolinguistic variation

The ease with which children can comprehend and reproduce variable forms in their own speech suggests that successful acquisition of variation is the norm. A growing body of research supports this claim, showing that at least some of the factors constraining the use of variable forms in adult speech are also at play in child speech at very early ages. Most studies investigating children's production of variable forms show that children are variable in their own production from the earliest ages tested (2-3 years of age), but do not always show adult-like patterns of variable use until later (5-7 years of age), and sometimes children show near-categorical use of one of the variant forms, at least in a subset of contexts (Chevrot, Nardy, & Barbu, 2011; Guy & Boyd, 1990; Kovac & Adamson, 1980; Shin, 2016; Smith, Durham, & Fortune, 2007, 2009).

Guy and Boyd (1990) examined /t, d/ deletion in English-speaking children and adults when it occurred in three contexts: as a (i) past tense marker of regular verbs (e.g. *missed* /mɪst/), (ii) as a past tense marker on semi-weak verbs (e.g. *kept* /kɛpt/), and on uninflected words (e.g. *mist*). Their study showed that adults omitted final /t, d/ more often on uninflected words (e.g. *mist*) than on regular past tense verbs (e.g. *kept*, *missed*) and semi-weak past tense verbs (e.g. *kept*), which indicates a tendency to produce final /t, d/ if it is a morphological marker. Similar to adults, children also showed higher rates of omissions on uninflected words than on regular past tense verbs; however, children differed from adults in that they showed near categorical rates of omissions on semi-weak verbs (e.g. *kept*). Findings such as this indicate that while children show variable production of variable forms, they do not necessarily have knowledge of the factors constraining the variation in adult speech, and sometimes may show categorical use of one of the variants in a subset of contexts.

The extent to which children show knowledge of adult-like patterns of variable forms in their own speech may depend on many factors, including the factors constraining usage, and the variable form under investigation (e.g. phonological form v. morphological form). For example, Shin (2016) proposes that the more frequent the number of tokens or observations of the variation, the earlier children will acquire the factors that constrain that variation. This suggests that variable forms that

are more frequently produced in the input, like phonological /s/ lenition/retention in Spanish, may be acquired earlier than variable forms that are not as frequent (e.g., variable subject pronoun expression). While there have not been studies directly comparing frequent vs. infrequent variable forms, Shin's proposal does make the prediction that /s/ lenition/retention should be acquired early in acquisition, because it is so frequent in the input. This prediction finds support in previous studies focused on children's acquisition of /s/ lenition in Spanish (Miller, 2013), where Chilean children as young as 4 years of age showed adult knowledge of the factors constraining /s/ lenition.

Stylistic factors constraining the use of the variant forms appear to take longer to acquire than grammatical factors. Roberts (1994) found that 3-4-year-old English-speaking children acquiring /t, d/ had acquired the phonological and morphological constraints on deletion, but had not yet acquired the social constraints. Her data consisted of recordings of sixteen children in a daycare center in a working class neighborhood of South Philadelphia, and eight of the children's caregivers in their homes. To analyze speech style, she coded for the type of activity that the child was involved in while speaking with the research assistant (e.g. role-playing, book reading activity, picture naming, and other). Her results showed that 3-4 year old children's /t, d/ deletions were not dependent on speech style but were dependent on linguistic constraints, indicating that it is grammatical and phonological constraints that are acquired earliest by children.

Only a few studies have investigated the extent to which caregivers modify their use of variable forms when speaking to their own children. These studies find that caregivers tend to produce the less stigmatized variant of a variable form when speaking to their very young children, children as young as 2 years of age, and that the use of the more stigmatized variant increases as the age of the child increases (Foulkes, Docherty, & Watt, 2005; Smith et al., 2007). This finding has led Smith et al. (2007) to propose that differences in the use of variable forms in the input to children can be linked to their caregiver's social value of such forms.

With respect to variable /s/ lenition in Spanish, there have been only two studies that have included children. Bullock et al. (2014) interviewed 30 literate and semiliterate Dominican Spanish-speaking children (16 female, 14 male) between 6 to 18 years of age to determine their use of /s/ lenition during a 15-minute recording of casual speech between the researcher and each child. The main focus of their analysis was whether certain phonological contexts impacted the speakers' retention of /s/ and also what role the speaker's sex and literacy (literate vs. semiliterate) played in their retention rates. Overall, they found that various phonological factors impacted the retention of coda /s/, which I will come back to later in the paper. They also found that literate children retained lexical /-s/ more often than semi-literate children and that girls retained lexical /-s/ more often than boys did (Literate Girls 59% (N=634); Literate Boys 22% (N=522); Semi-literate Girls 27% (N=278); Semi-literate Boys 6% (N=206). Miller (2007, 2013) also found that 4-5 year old Chilean Spanish-speaking girls retained /s/ (either as an aspiration or full form /s/) more often than boys did; however, the difference between groups was much lower (Boys 47%; Girls 53%) than what was found in the Dominican children, and the differences between Chilean boys and girls were not significant. This difference in finding – between Dominican children and Chilean children – is most likely due to the differences in age. Bullock et al.'s Dominican children ranged from 6-18 years of age, while Miller's Chilean children were only 3-5 years of age. It may be that the Dominican children showed a difference due to sex because they were, as a group, substantially older and have learned the impact of gender on /s/ lenition. Because children were combined into one age group (ranging from 6-18 years), it is impossible to tell from Bullock et al.'s study whether there were developmental patterns in their data.

Data and method

The present study builds on previous work by investigating coda /s/ lenition in a group of 5;0-7;5 year old Dominican Spanish-speaking children and their caregivers. Differences in the present study allow us to address questions that previous studies cannot address. First, the children's age range was

substantially decreased (compared to Bullock et al. 2014) so as to ascertain whether children's use of /s/ lenition is constrained by the same factors that constrain adult usage. The children's age range in Bullock et al. (2014) was from 6 to 18 years; because the data was combined together, it is impossible to know whether there were any developmental patterns. Second, data was collected both in a formal and a casual setting, and we did not combine this data, in order to investigate the impact of speech style on child and adult coda /s/ retention. This allows us to determine, how different social contexts impact children's and adults' lenition of syllable final [s]. Finally, we recorded caregivers speaking to their children alone in a playroom setting in order to investigate whether coda /s/ lenition in child-directed speech (by caregivers) is similar to that found in adult-to-adult speech (e.g. an adult speaking with a research assistant). For comparative purposes, we were very careful to keep other pieces of the study as similar as possible to Miller (2013) and Bullock et al. (2017). We coded phonological context in the exact same way as Bullock et al. (2014). In addition, data collection in the Dominican Republic was virtually identical to data collection with Chilean children, described in Miller (2013).

Participants

Children and their caregivers were recorded in the city of Santo Domingo of the Dominican Republic during the summers of 2014 and 2015. The data presented in this paper form part of the Dominican Child-Caregiver Corpus (Miller in preparation), which contains approximately 160 hours of spontaneous speech between 40 Dominican children and their caregivers and 40 hours of spontaneous speech between the Dominican caregivers and another adult.

The recordings were made in a working-class neighborhood in a small apartment that was converted into a playroom lab space. The apartment was located near the school that the children attended. Child-caregiver dyads visited the lab four times for 60 minutes each time over the course of two months. The caregiver returned a fifth time to the lab with another adult so that we could record 60 minutes of the caregiver's adult-directed speech. This allows us to compare child-directed speech to adult-directed speech in the same individuals in order to investigate how caregivers change their speech when speaking to their children. All adults were compensated for their participation.

Children were also interviewed in their schools by a native-speaking Spanish research assistant. For the present paper, I report the production data from both the school setting and the lab setting. In the school setting, twenty-three children (10 females: ages 5;9-7;4, M=6;6 and 13 males: ages 5;0-7;5, M=6;7) were interviewed by a native-speaking researcher from the same local area as the children. These children participated in the Repetition and Retell Task. In the lab setting, eight of these same children (4 females: ages 5;9-6;5, M=6;0 and 4 males 5;0-6;9, M=6;0) were recorded while playing with their caregiver. This corpus data allows us to examine both the children's speech and the caregivers' child-directed speech.

Data collection

Data collection occurred in two different contexts that varied in formality: (i) A repetition and retell task was carried out in the children's school and (ii) child-caregiver conversations were recorded in a lab setting. This allowed us to elicit two different speech styles, with the school setting being more formal and the lab setting less formal. The school setting is considered a more formal setting because, in addition to being at the child's school, the child was interviewed by a research assistant who they did not know. The lab setting was considered a less formal setting, as it was a home-like setting with a playroom and the child spent the entire hour alone with their own caregiver.

Story repetition and retell in the school setting

Children, whose parents signed a consent form, were invited to participate. Data was collected in the school library when it was not being used, as this was the quietest location within the school. A native-speaking Spanish research assistant from the same local area carried out the task with children, while

a second research assistant observing took notes on any difficulties the child may have had with the task. Children were presented with a modified version of Eric Carle's children's book *Brown Bear, Brown Bear What Do You See?* and were asked to listen to the research assistant as she read the story. Each page had a picture and one sentence describing the picture. The researcher read the sentence and the child repeated it. There were 24 pages with 24 sentences that children were asked to repeat. After the repetition portion of the task, children were then asked to retell the story entirely on their own. As such, data collection involved two tasks: a repetition task and a retell task. This methodology is similar to that reported in Bullock, Toribio, and Amengual (2014), where children participated in a story retelling task. Unlike Bullock et al. (2014) however, we did not combine the spontaneous speech and story-telling data in our analysis, rather we analyzed the story-retelling data separately from the spontaneous speech data.

[INSERT FIGURE 1 HERE]

The story was modified so that it would contain a variety of final coda /s/ tokens, including plural complex noun phrases with plural marker /-s/ (e.g. *dos ranas verdes* 'two frog-PL green-PL'), the second singular verbal affix /-s/ (e.g. *ves* 'see-2SG'), and non-morphological /s/ (e.g. *pescado* 'fish'). Similar to the study reported in Miller (2014) on Chilean children's use of /s/ lenition, the research assistant always pronounced the final /s/ as an alveolar fricative during the repetition task.

Child-caregiver speech in a playroom lab setting

In the spontaneous speech portion of the study, children and their caregivers were recorded while they played together alone in the apartment lab playroom. The playroom was equipped with several toys, including puzzles, a race car set, a toy camper play set, a food stand play set, stamps, dolls, toy animals, craft activities (e.g., mask decorating, beading necklaces), interactive games, and children's books. Children and their caregivers were left alone in the playroom during each recording session to reduce the effect of the observer's paradox. Distinguishing between /s/ and omissions can be difficult and, for this reason, participants were recorded in a lab playroom setting and not in their homes so that ambient noise could be controlled. Before participants arrived, we ran the air conditioner so that it could be turned off during recording session. Turning off the air conditioner during the recording session allowed us decrease any hissing noise in the recordings so that we could detect whether speakers ever produced coda /s/ as an aspiration.

Recordings in both the school and in the apartment playroom were made with a Zoom H4N Digital recorder (recorded at 48 kHz) that was connected to two AT831b cardioid lavalier condenser microphones that were each connected to a baseball cap—one for the parent and one for the child (see Miller 2013 for more details). This placed the microphone approximately 7 inches in front of the participant's mouth.

Data coding

The recordings collected in both the school and the lab playroom were transcribed with either ELAN (Lausberg & Sloetjes, 2009) or CLAN (MacWhinney, 2000). For the tasks run at school, all words containing a coda /s/ were coded for pronunciation. For the child-caregiver spontaneous speech data that was collected in the lab playroom, the first 100 tokens from each of the eight children and the first 100 tokens from each of their caregivers were coded in the same way. Tokens that were excluded from the outset were tokens where the entire syllable was reduced (e.g. *está* → [tá] 'it is', *espérate* → [pérate] 'wait-2.PL') and tokens of coda /s/ that were followed by words with initial /s/, as it would prove difficult to ascertain whether the word final /s/ was produced or not (e.g. *las cebras* 'the zebras'). Tokens involving pluralia tantum, which can appear with or without final /s/ (e.g., *la tijera/las*

tijeras ‘the scissors’, *el patalón/los pantalones* ‘the pants’). As noted by Bullock et al. (2014), Dominican Spanish-speakers produce either the full form /s/ or they omit it in vernacular speech; aspiration of /s/ in Dominican Spanish is rare. As such, their coding was done auditorily and the dependent variable was binary (/s/ v. omission). This method proved successful, as only less than 1% (20/3,500) of the tokens they coded were too difficult to code by ear. Similar to their study, our data were coded auditorily and the dependent variable was binary (presence v. absence of /s/).

Results

Overall distributions in spontaneous speech in playroom with caregiver

The analysis of the spontaneous speech data yielded 3,200 tokens (1,600 caregiver tokens; 800 girl tokens; 800 boy tokens). Overall, children and their caregivers patterned together in their retention of final /s/ in spontaneous speech. Of the 1,600 /s/ tokens produced by caregivers, 21% were [s]. Girls retained [s] 27% of the time and boys did so 23% of the time. The overall distribution of 21% [s] tokens in our caregiver speech is slightly lower than what was reported in Bullock et al. (2014), where literate female adults produced [s] 36% of the time when speaking with a native-speaking research assistant. This difference in results may likely be due to differences in data collection procedures. In Bullock et al. (2014) the presence of the researcher during the interviews may have prompted slightly more /s/ tokens than in the present study where the researcher was not present during the caregiver-child recording session. It is unlikely that this difference is due to a difference between child-directed speech (in the present study) and adult-directed-speech (in Bullock et al. 2014), as one would predict an increase in [s] retention in child-directed speech, which we did not find here, but we did find in previous work with much younger children (see Miller 2014). We will come back to this in the discussion section.

Multivariate analysis

We used a comparative variationist methodology (Labov, 1972; Tagliamonte, 2012) to examine children and caregiver production of [s] retention. The following internal and external environments were investigated: following phonological segment, morphological function, and sex of child speaking or being spoken to. Because of the differences in data collection in the school setting (experimental task) and lab setting (spontaneous speech), we investigated speech style by running separate multivariate tasks for each setting.

Following phonological segment. In order to allow for a direct comparison to the Dominican Spanish data in Bullock et al. (2014), the same following phonological contexts were investigated. These include contexts where coda /s/ occurred word medially, word finally, and before a pause combined with type of the following segment – vowel, voiceless stop, voiced approximant, liquid, nasal, and fricative.

Morphological function. A three-way division was made — lexical /s/ (nonmorphological), plural marker /-s/, and the 2sg verbal affix /-s/.

Gender of child. Similar to Smith et al. (2007, 2009) and Miller (2014), data were divided into sex of the child speaking or being spoken to in order to determine whether caregivers change their production of /s/ when speaking with boys versus girls.

Table 2 shows the results of the multivariate analysis for production of coda /s/ as the full form [s]. The factors that contributed significantly toward the retention of [s] are listed in bold. In Table 2, the Input (caregivers: .177; children: .219) refers to the overall likelihood for the occurrence of retention. The column labeled factor weight (FW) indicates the probability that the corresponding factor contributes to the occurrence of retention of the full form [s]. The closer the number is to 0, the

less likely it is that retention of [s] will occur. Numbers closer to 1 indicate more likelihood for retention. The range typically indicates the relative strength of the factor group to the analysis. The second column shows the percentage of [s] tokens for each factor, and the third column indicates the total number of tokens for each factor. The results indicate that in both the children’s speech and their caregiver’s speech, morphological class, phonological context, and gender of the child speaking or being spoken to, are significant predictors of [s] retention.

Table 2. [s] production in children and adults spontaneous speech

Retention of [s]	Children (N = 1600; 25% [s] production) Input: .219; p = 0.019			Caregivers (N = 1600; 21% [s] expression) Input: .177; p = 0.001		
	FW	% [s]	N (% data)	FW	% [s]	N (% data)
Morphological Class						
Plural Marker /-s/	.65	31%	454 (28%)	.62	21%	391 (24%)
Lexical /s/	.50	25%	952 (60%)	.50	24%	1008 (63%)
2sg Verbal Affix /-s/	.20	7%	194 (12%)	.30	6%	201 (13%)
<i>Range</i>		45			32	
Phonological Context						
Medial_N/L	.81	52%	19 (1%)	.54	54%	13 (1%)
Final_V	.61	28%	296 (19%)	.43	14%	384 (24%)
Medial_T	.57	28%	496 (31%)	.73	36%	453 (28%)
Prepausal	.54	29%	356 (22%)	.52	23%	265 (17%)
Final_T	.39	18%	197 (12%)	.34	11%	222 (14%)
Final_F	.33	15%	41 (3%)	.29	8%	38 (2%)
Final_D	.30	13%	90 (6%)	.30	10%	117 (7%)
Final_N	.22	9%	55 (3%)	.23	8%	50 (3%)
Final_L	.12	4%	50 (3.1)	.35	12%	57 (4%)
<i>Range</i>		69			50	
Gender						
(Caregivers of) girls	.54	27%	800 (50%)	.57	25%	800 (50%)
(Caregivers of) boys	.47	23%	800 (50%)	.43	17%	800 (50%)
<i>Range</i>		7			14	

Note: Bold values are statistically significant. n/s = not significant

As indicated by the probability values in Table 2, the direction of the effect of the various factor groups is similar in both child and caregiver speech, suggesting that children have acquired adult-like

usage of /s/ retention in Dominican Spanish by 5 years of age. Phonological context shows the greatest *Range* between the highest and lowest probability within the factor group, followed by morphological class, and then gender for both children and their caregivers.

Consistent with Bullock et al.’s (2014) data on Dominican Spanish speech, four internal levels of phonological context favored [s] retention in both our caregiver speech and children’s speech: word internally before nasals/liquids (Medial_N/L), word finally before a vowel (Final_V), word internally before a voiceless stop (Medial_T), and before a pause (Prepausal). The finding that these four phonological contexts impact caregiver speech indicates that [s] retention in adult-to-adult speech (i.e., adults speaking to a researcher), as observed in Bullock et al. (2014), is similar to coda /s/ retention in caregiver speech. In fact, it doesn’t appear that Dominican adult speakers change their usage of /s/ lenition when speaking casually to their own children. In addition, the data show that by 5 years of age, Dominican Spanish-speaking children have acquired knowledge of the phonological contexts impacting /s/ retention.

In terms of morphological class, the plural marker favored /s/ retention while the 2sg affix disfavored retention in both child and caregiver speech. Lexical /s/ had a neutral effect. These results parallel those found for Chilean caregiver-child conversations reported in Miller (2013). As noted above, Spanish has number agreement inside the determiner phrase, such that all elements are marked with plural marker /s/. Table 3 shows the percentage of /s/ retention for each syntactic category. Overall, children retain /s/ more often than their caregivers across the various syntactic categories. With respect to caregivers, they retain /s/ more often on determiners, nouns, and quantifiers and less often on adjectives and pronouns. Children appear to retain /s/ more often on determiners and nouns, although a strong pattern is not observed in the data.

Table 3. Retention of plural marker [-s] within the determiner phrase in spontaneous speech

	Adults	Children
Determiners	26% (32/124)	34% (50/145)
Quantifiers	24% (5/21)	25% (4/16)
Nouns	20% (38/186)	30% (70/232)
Adjectives	16% (5/32)	24% (7/29)
Pronouns	0 (0/28)	25% (8/32)

Although a smaller effect, as indicated by the lower range, the child’s gender impacted /s/ retention in that girls favored retention while boys disfavored it. Likewise, caregivers showed more [s] retention when speaking with girls than when speaking with boys. Bullock et al. (2014) also found differences in [s] retention between male and female children and adults; however, the difference between male and female speakers was much larger (i.e., Bullock et al. showed a range of about 40, while our range was 7 for children and 14 for their caregivers). This difference between the two studies may be attributed to the methods of data collection, as mentioned above. Our spontaneous speech data involved just the child and caregiver talking alone together, whereas in their study a

researcher interviewed participants, which may have led to more formal speech patterns among female speakers. We turn to this idea now in reviewing our results from the experimental data collected in the school setting.

Overall distributions in experimental tasks at school with researcher

Children produced a total of 1,705 tokens in the Repetition and Story Retell Task. Of the 415 /s/ tokens produced by girls in the Repetition Task, 76% were pronounced as [s] and of the 379 /s/ tokens in the Story Retell Task 71% were pronounced as [s]. For boys, of the 537 /s/ tokens in the Repetition Task 54% were pronounced as [s] and of the 374 in the Story Retell Task 59% were pronounced as [s]. This rate of the full form [s] production in Dominican children is substantially higher than what was reported in Miller (2014) for Chilean children, who produced final /s/ as the full variant [s] only about 20% of the time in a similar repetition task, instead preferring the lenited forms (aspiration or omission). These results highlight style-shifting in Dominican children's [s] retention, as the percentages are much higher than we found in the spontaneous speech data. Additionally, the data show that young girls retain coda /s/ in the school setting much more often than boys do, illustrating the impact of gender on [s] retention in Dominican Spanish-speaking children. It is important to note that, overall, children did not show substantial differences between the two experimental tasks, producing similar rates of [s] in both the Repetition Task and the Story Retell Task.

To determine whether children showed the same constraints governing their [s] retention in the school setting as they did in spontaneous speech with their caregivers, a multivariate analysis was carried out. The same following internal and external environments were investigated: following phonological segment, word position, morphological function, and sex of child speaking or being spoken to. In addition, the speech task (repetition task, story retelling) was also included. Table 4 shows the results. The data indicate that the same factor groups influencing [s] retention in children's spontaneous speech also impacts their [s] retention in the experimental study; however, the overall rate of [s] retention, the ordering of the factors, and the ranges between the factors within each factor group differ. Children produce much higher rates of [s] in the school setting, and this is more apparent for girls (overall [s] retention in spontaneous speech 27%; overall [s] retention in school setting 74%) than for boys (overall [s] retention in spontaneous speech 23%; overall [s] retention in school setting 56%). This indicates that Dominican Spanish-speaking children's [s] retention is impacted by speech style, and this is especially prevalent among young girls.

With respect to morphological class, the ordering of the factors shifted, such that [s] retention was higher for the 2sg verbal affix than for lexical /s/ or plural marker /-s/. This result was unexpected; but, we believe it was due to the nature of the experimental tasks. In the story repetition and retell tasks, the 2sg affix always occurred on a single verb (*ves* 'see-2sg'), while the plural marker occurred on a variety of different words. The most reasonable explanation is that it was less demanding for children to produce coda-s on a single verb throughout the experiment than it was for them to produce coda-s on a variety of different nominal elements. Moreover, in the experimental task many of the noun phrases included a determiner, noun, and adjective; it may have been more difficult for children to reproduce the coda-s on every element in the noun phrase in such a task. In the spontaneous speech data, speakers produced fewer noun phrases that were modified by adjectives, which may explain why the plural marker /-s/ is retained at higher rates than lexical /s/ in the spontaneous speech data. So, we are cautious to make too much of this shift in factor ordering between the two sets of speech data.

Table 4. Children's [s] production in experimental tasks

Retention of [s]

(N = 1705; 64.5% [s] production)

Input: .660; $p = 0.05$			
	FW	% /s/	N (% data)
Morphological Class			
Plural Marker /-s/	.42	58%	1122 (66%)
Lexical /s/	.62	74%	388 (23%)
2sg Verbal Affix /-s/	.72	84%	195 (11%)
<i>Range</i>		30	
Phonological Context			
Medial_N/L	<i>na</i>	<i>na</i>	<i>na</i>
Final_V	.56	71%	69 (4%)
Medial_T	.48	74%	131 (8%)
Prepausal	.53	69%	596 (35%)
Final_T	.50	60%	438 (26%)
Final_F	<i>na</i>	<i>na</i>	<i>na</i>
Final_D	.51	67%	260 (15%)
Final_N	.44	53%	122 (7%)
Final_L	.33	49%	89 (5%)
<i>Range</i>		23	
Speaking Task			
Repetition Task	[.50]	64%	952 (56%)
Story Retell Task	[.51]	66%	753 (44%)
<i>Range</i>		<i>n/s</i>	
Gender			
Girls	.61	74%	794 (47%)
Boys	.40	56%	911 (53%)
<i>Range</i>		21	

Note: Bold values are statistically significant. n/s = not significant

Taking a closer look at where the plural marker was produced in noun phrases, we found that in both the repetition and retell portions of the experimental task, children retained plural marker /-s/ more often on nouns than on determiners and adjectives. This pattern is slightly different than what was found in the children's spontaneous speech data, where determiners and nouns had similar levels of coda /s/ retention, as is shown in Table 5.

Finally, the range between the highest and lowest factors in the phonological context factor group decreased, which we believe is due to the overall increase of /s/ retention within the school setting. To be specific, coda /s/ production in factors comprising the lower end of the phonological factors (e.g. Final_L) increased substantially in the experimental tasks, while the factors at the higher end (e.g. Medial_N/L) already showed high levels of coda /s/ production, and so the increase in coda /s/ production between the spontaneous speech data and the experimental data was for Medial_N/L was less substantial. This pattern resulted in an overall decrease in the range of this particular factor group.

In addition to coding for phonological context, morphological status, and gender of the child, we also coded for the part of the experimental task in which the child produced the /s/ token, either the repetition portion or the retell portion of the task. Our prediction was that children would retain /s/ more often when repeating sentences than when retelling the story later on during the experiment. This prediction was not borne out, as children showed no differences in /s/ retention between the two parts of the experimental task.

Table 5. Retention of [s] within the determiner phrase in repetition task and story retell task

	Repetition Task	Story Retell Task	Spontaneous Speech
Determiners	51% (37/73)	46% (37/80)	34% (50/145)
Nouns	64% (198/310)	64% (181/284)	30% (70/232)
Adjectives	40% (46/116)	40% (29/73)	24% (7/29)

Discussion

This paper set out to address the following research questions. In what follows, we will address each question in turn.

Is children's use of /s/ lenition constrained by the same linguistic factors that constrain adult usage? The short answer to this question is 'yes'. Overall, we found that young Dominican Spanish-speaking children's production of coda /s/ is constrained by the same factors that are found in their caregivers' speech. In the spontaneous speech data, both children and their caregivers show the following ordering of factor groups: Phonological Context > Morphological Class > Gender. What's more, the ordering of factors within each factor group is virtually identical.

With respect to phonological context, both children and adults favored [s] retention in word medial position before nasals, liquids, and voiceless stops, in word final position before vowels, and before pauses. Retention of [s] was disfavored in the other phonological contexts examined. Miller (2013) found similar results in young Chilean children and their caregivers. In that study, both word position and phonological context were not combined, so a direct comparison of the Dominican and Chilean data is difficult. Nonetheless, similar to the Dominican data, Chilean children and their caregivers retained coda /s/ more often in phrase final position, than in other word positions (i.e., word medially, word finally).

With respect to morphological class, in the spontaneous speech data, both Dominican Spanish-speaking children and adults favored [s] retention when it was a plural marker and disfavored retention when it was a second singular verbal affix. Lexical /s/ had a neutral effect. This finding was different from what we found for Chilean children and their caregivers in our earlier work. In that study, Chilean children and their caregivers favored [s] retention when it occurred on the second singular verbal affix, but disfavored [s] retention when it occurred as a plural marker. This highlights a difference in the patterns of /s/ lenition between Dominican Spanish-speakers and Chilean Spanish-speakers, a difference that is already apparent in speakers as young as 5 years of age.

Finally, we found that Dominican Spanish-speaking caregivers retained coda /s/ more often when speaking to young girls than when speaking to young boys. This was mirrored in the Dominican child data, such that young girls retained coda /s/ in their own speech more often than young boys. While gender impacted [s] retention in Dominican-Spanish, it did not do so in Chilean Spanish. Chilean caregivers did not retain coda /s/ differently when speaking to boys or girls, and Chilean girls and boys retained coda /s/ at similar rates. This may indicate differing patterns of /s/ lenition in the two varieties of Spanish or this difference may be due to an age difference between the Dominican Spanish-speaking children and the Chilean children. Previous studies have found that adult females lenite coda /s/ in both dialects of Spanish more often than males do (Cepeda 1995, Bullock et al. 2014). This suggests that we should find differences in /s/ lenition rates by caregivers to their children at some point in development in both varieties. One difference between the Dominican Spanish-speaking children and the Chilean Spanish-speaking children is that the latter are younger overall. In

particular, the Chilean Spanish-speaking children in Miller (2013) were 4-5 years of age, while the Dominican Spanish-speaking children were 5-7 years of age. It may be that caregivers do not change their [s] retention rates when speaking to girls v. boys until children are a little older. This could explain why the gender of the child did not impact [s] retention in Miller (2013). To sum up, in our analysis of /s/ lenition in Dominican Spanish, children are variable in their production of coda /s/ at the earliest ages investigated, and their variable production patterns with that found in their caregivers' speech.

Do different social contexts impact children's lenition of coda /s/? The answer to this question is also 'yes'. We find that children retain the full variant [s] more often in the school setting, than they do in the lab playroom setting. There are various differences between the school setting and the lab playroom setting that impacted the formality of the context. Not only was the school setting more formal than a playroom setting, but also the child in the school setting participated in a story-telling task which was administered by a research assistant who the child did not know personally. In the lab playroom setting, there was no formal task and children played with their own caregiver. These differences were intentional so that we might elicit different speech styles in the children.

In the school setting, we find a substantial increase in the retention of the full variant [s] in both Dominican Spanish-speaking boys and girls; although, the increase in [s] is much more substantial for young girls, who produced the full variant [s] 74% of the time in the school setting. This increase seems exaggerated, as we did not find such differences between repetition tasks and spontaneous speech tasks in most Chilean children (although there were some Chilean children who retained [s] more often in repetition tasks, see Miller 2014). This is the first set of data, that we know of, that shows that speech style impacts young Spanish-speaking children's production of variable /s/ lenition, and that it does so more often for girls than for boys.

Is /s/ lenition in child-directed speech similar to that found in adult-to-adult speech? To address this question, we compare our caregiver speech to the adult-to-adult speech in Bullock et al. (2014). Overall, our findings for caregiver speech parallel those reported in Bullock et al. (2014) on adult-to-adult speech. We find no evidence that Dominican Spanish-speaking caregivers are modifying their coda /s/ retention when speaking to their own children. Instead, it appears that adult speakers produce similar amounts of coda-s retention and in similar contexts in both child-directed and adult-directed speech. Overall, this patterns with Miller (2013), who found that caregivers did not appear to change their variable use of /s/ lenition when speaking to their 4-5 year old children. The only case where differences in /s/ lenition were found between child-directed and adult-directed speech was by caregivers speaking to their 2-3 year old children. In the present study, we conclude that by 5-7 years of age, Dominican Spanish-speaking caregivers do not alter their use of variable /s/ lenition when speaking to their own children.

Conclusion

This study set out to document coda /s/ lenition in the speech of Dominican Spanish-speaking children and their caregivers. The data show that 5-7 year old children are variable in their retention of coda /s/ and that their patterns of variability match what is found in their caregivers' speech. Overall, we found virtually no tokens of the aspirated variant [h]; rather, both children and adults produced either the full variant [s] or they omitted it. The analysis provides no evidence that Dominican Spanish-speaking adults retain coda /s/ more often when speaking to their own children (at least when their children are between 5-7 years of age) as compared to when speaking to other adults. Finally, our study revealed, for the first time, that speech style impacts young children's variable production of coda /s/, a finding that is more prevalent for young girls than for young boys.

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Appendix A

Story Repetition and Retell Task

1. Oso marrón, ¿qué ves tú?
bear brown, what see-2SG you
'Brown Bear, What do you see?'
2. Osos marrones, ¿qué ven Ustedes?
bear brown, what see-2PL you
'Brown Bears, What do you see?'
3. Yo veo los gatos morados.
I see the-PL cat-PL purple-PL
'I see the purple cats.'
4. ¿Qué comen los gatos?
what eat-3PL the-PL cat-PL
'What do the purple cats eat?'
5. Ellos comen pescado.
they eat-3PL fish
'They eat fish'
6. Nosotros vemos un caballo azul.
we see-1PL a horse-SG blue-SG
'We see a blue horse'
7. ¿Qué come el caballo azul?
what eat-3SG the-SG horse-SG blue-SG
'What does the blue horse eat?'
8. Él come manzanas.
he eats-3SG apples-PL
'He eats apples'
9. Yo veo las ranas verdes.
I see-1SG the-PL frog-PL green-PL
'I see the green frogs'
10. ¿Qué comen las ranas?
what eat-3SG the-PL frog-PL
'What do the frogs eat?'
11. Ellas comen moscas.

- They eat-3PL fly-PL
'They eat flies.'
12. Yo veo un pájaro rojo.
I see-1SG a bird-SG red-SG
'I see a red bird.'
13. ¿Qué come el pájaro?
what eat-3SG the-SG bird-SG
'What does the bird eat?'
14. Él come uvas.
he eat-3SG grape-PL
'He eats grapes.'
15. Nosotros vemos los patos amarillos.
we see-1PL the-PL duck-PL yellow-PL
'We see the yellow ducks.'
16. ¿Qué comen los patos?
what eat-3PL the-PL duck-PL
'What do the ducks eat?'
17. Ellos comen gusanos.
they eat-3PL worm-PL
'They eat worms.'
18. Yo veo un mono marrón.
I see.1SG a monkey-SG purple-SG
'I see a purple monkey'
19. ¿Qué come el mono?
what eat-3SG the-sg monkey-SG
'What does the monkey eat?'
20. Él come guineos.
he eat-3SG banana-PL
'He eats bananas.'