Que le vamoh aher? Taking the syllable out of Spanish /s/ reduction.

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1 Pathways of /s/-Reduction

Ferguson (1990) distinguishes two typological pathways of the change [s] > [h]: the Greek type and the Spanish type. While "the crucial phonetic condition" in the Greek type "is the presence of a following vowel," in the Spanish type it is "the syllable final position of the /s/" (Ferguson 1990:72). The Greek type begins in intervocalic position and proceeds to word initial and then to preconsonantal positions. The Spanish type starts in syllable final positions, first word medially and then word finally before a consonant. Aspiration extends "last, if at all, to word initial position" (Ferguson 1990:64). Indeed, syllable final /s/ is the most studied phonological variable in Spanish linguistics and patterns of /s/ reduction demarcate geographic, social, and stylistic varieties. In contrast, syllable-initial /s/ variation in Spanish is assumed to be limited to a few regions and has received scant linguistic attention.

An important reason for this neglect is that syllable initial /s/ variation has been thought to be of little theoretical interest, since the prevailing assumption is that it is a straightforward extension of processes of syllable final reduction. The generally accepted model for extension of /s/ reduction in Spanish is presented in Figure 1. This diffusion pattern is taken to be both the diachronic pathway of change and the synchronic hierarchy ordering Spanish varieties from less to more "advanced" or "innovative" (Lipski 1999:198, 206-7; Penny 2000:149-50).

i) Word medial and word final, syllable final: preconsonantal
   S > h / Vs$C ex.: [lah mohkas] *las moscas*
ii) Word final, phrase final: prepausal
   S > h / Vs## ex.: [lah mohkah] *lah moscah*
iii) Word final: prevocalic
   S > h / Vs##V ex:: [eh asi] *es así*
iv) Word initial: prevocalic
   S > h / ##sV ex.: [hi heñor] *Sí señor*
v) Word medial, syllable initial: prevocalic
   S > h / VsV ex.: [ke paha] *¿qué pasa?*

Figure 1. Diffusion pattern for /s/ aspiration (cf. Méndez Dosuna 1996)

According to this model, the development of /s/ reduction begins syllable finally in preconsonantal contexts (stage i, *las moscas*) and thence may extend to phrase final (stage ii: *las moscas*). The most advanced, and final, stage for most dialects is extension to word final prevocalic position (stage iii: *es así*). Initial /s/ reduction (stage iv: *sí senor*) "only occurs in dialects where [word-final prevocalic /s/ reduction] has been generalized" (Lipski 1999:198). As Lipski (1999:199) states, "the ultimate configuration would include word-internal /VsV/ combinations, and in some marginal varieties of Spanish this extension is in its incipient phase" (stage v: *qué pasa*).[15]

To our knowledge, the pattern of extension outlined in Figure 1 has never been tested empirically in a synchronic variety. This is the objective of the present study. We show that the proposed hierarchy does not hold by comparing rates and constraint hierarchies for /s/ reduction across syllable and word positions in data from Chihuahua, Mexico. We find a higher rate of reduction word internally in syllable initial position (*ese*) than in syllable final position (*este*) and word finally before a pause and a vowel than in preconsonantal contexts. The comparison of constraint hierarchies reveals a different ordering of conditioning factors in the different positions. Syllable finally, following phonological environment makes the greatest contribution to /s/ reduction, while syllable initially, it is preceding environment that is more important. Differences in the ordering of conditioning factors and factor groups provide evidence against a unitary process, at least not the one assumed, of extension from preconsonantal (syllable final) to prevocalic contexts. Spanish /s/ reduction, in fact, may have affinities with the "Greek" type. Rather than syllable position in this initial-/s/-reducing data, vocalic phonotactic patterns emerge as an important conditioning factor.

2 Data

The data reported on here are extracted from approximately two and a half hours of recorded speech from four males from Ascención, Chihuahua, in northern Mexico (about 200 km southwest of Ciudad Juárez). Given these limitations, we do not make claims about the representativeness of the findings, nor do we discuss social and stylistic factors. Other studies have shown social and stylistic effects (Brown 1993) and in the variable rule analyses we conducted, speaker differences were significant (the ordering of the speakers was consistent, though). In northern Mexico, syllable initial /s/ aspiration occurs in varieties spoken in rural areas by speakers with relatively little

[15] Mendez-Dosuna (1996) orders word internal prevocalic /s/ aspiration ahead of word initial.

schooling, often labeled "ranchero" talk. It is not clear whether this is a case of stable variation or of ongoing change.

We coded all occurrences of standard Spanish orthographic *s, z, c* (before *e* or *i*), and *x* (*examinar* and *experiencia*). These are the contexts for the realization of /s/. In circumscribing the variable context, we included sequences of /s/ at word boundaries. Though excluded in other studies as neutralizing contexts, we found variation, for example *les sale* [les hale] 'it turns out for them' (C.a.3) and *es cierto* [eh sierto]-'it is true' (DC.a.6).

The number of tokens is 3839, with just over 1,000 each in word initial (*señor*), word medial/syllable initial (*ese*), and word final (*vamos*) position. For word medial/syllable final position (*este*), the total is just over half. This is because word medial preconsonantal /s/ is a context of considerably lower occurrence than word final /s/, between 3.5 and 4 times less frequent in the data.[16]

Most dialects of Spanish where the loss of coronal features of /s/ occurs show a range of phonetic variation (e.g. Penny 2000:122-4). In this study this is reduced to three phonetic categories, "sibilant realization" [s] (including the voiced allophone [z]), "aspiration" [h], and "deletion" [Ø]. For the variable rule analyses, however, we combined aspiration and deletion, in order to focus on the process as one of phonetic reduction or weakening. We note, though, that the distribution of reduced variants is different syllable finally versus initially. In syllable final position, both word finally (*vamos*) and medially (*este*), deletions and aspirations are roughly equal. In syllable initial position, in contrast, aspiration predominates over deletion with 92% of reduced tokens word initially (*saca*) and 82% word medially (*pasa*).

3 Rates of /s/ Reduction

The hypothesis that syllable initial /s/-reduction is a diachronic extension of syllable final processes implies a prediction about synchronic variation. Consistent with the stages outlined in Figure 1 is that reduction will be higher in syllable final than syllable initial positions. We thus compared /s/ reduction in four positions: word initially (*señor* 'Mr., man'), word internally/syllable initially (*dicen* 'they say'), word internally/syllable finally (*hasta* 'until'), and word finally. The rate of reduction in these four positions is summarized in Table 1. For word final position, to enable comparison with the model in Figure 1, we distinguish preconsonantal, prevocalic, and prepausal contexts (*los gatos, las alas, todos*), in Table 2.

[16] The 569 word medial/syllable final tokens correspond to more recorded material.

Word Initial prevocalic	Medial (syl.init.) prevocalic	Medial (syl.fin.) preconsonantal	Word Final
218/1044 = 21%	380/1110 = 34%	125/569 = 22%	504/1116 = 45%
[h]*í*, [h]*eñor*	*di*[h]*en*	*ha*[h]*ta*	see Table 2
stage iv (Fig.1)	*stage v (Fig.1)*	*stage i (Fig.1)*	*stage i,ii,iii (Fig.1)*

*Reduction rate is higher word medially in prevocalic than preconsonantal position (Chi-square = 26.91058, p = .0000), and higher prevocalically in word medial than initial position (Chi-square = 47.83179, p = .0000). Difference between word initial and medial/syllable final position is not significant.

Table 1. /s/ reduction rates by word and syllable position (N = 3839)

Context	Example	Reduction rate	N	% data
___##C	*toda*[h] *partes*	42%	656	59
___##V	*todo*[h] *allá*	47%	221	20
___//	*todo*[h].	54%	230	21

*Reduction rate is higher in prepausal than preconsonantal contexts ($p < .01$). No other differences are statistically significant.

Table 2. Word final /s/ reduction rates (N = 1107)

There are two mismatches between the rates in Table 1 and the stages in Figure 1. The most striking is in word medial position, where reduction is higher in prevocalic (syllable initial) than preconsonantal (syllable final) contexts, with 34% and 22%, respectively. Indeed, word internal/syllable final position, putatively the earliest and most favorable context for /s/-reduction (cf. Ferguson 1990:64), shows the lowest rate in these data! This is virtually identical to the reduction rate word initially (21%), in contrast to Figure 1, where word initial position is placed in stage iv.

A second mismatch is in the ordering of the syllable initial prevocalic positions, with word medial showing higher reduction rates than word initial (34% vs. 21%). This goes against Lipski's (1999:199) prediction that "the ultimate generalization" would include word internal intervocalic contexts, depicted as stage v in Figure 1. However, the ordering in this data, intervocalic before word initial, does concur with the Greek [s] > [h] change (Ferguson 1990:66).

These mismatches suggest that the patterns of /s/ variation in the present data do not fit the generalizations and predictions in Figure 1. Word final reduction rates by phonetic context (Table 2) confirm the incongruity. Other

well-studied dialects (e.g., Cuba and Argentina, cf. Terrell 1977, 1978, 1979) show higher reduction rates before a consonant than before a pause or a vowel.[17] In contrast, the ordering in Table 2 is prepausal > prevocalic > preconsonantal. And, although the results agree with the generalization that prevocalic reduction rates are higher word finally than initially and medially (Lipski 1999:198-9, 206), the relative order of word initial and medial does not match the predictions, as noted above.[18] Thus, Lipski's (1999) proposal for a single model of /s/ reduction based on ambisyllabification of word final prevocalic /s/ extending to word initial postvocalic /s/, which essentially maintains the syllable-final (preconsonantal) position of the /s/ as the crucial phonetic condition, does not work here.

4 Constraints on Final and Initial /s/ Reduction

Particularly apt for evaluating the diffusion model outlined in Figure 1 is variable rule analysis, which provides evidence on statistical significance of effect (p-value), magnitude of effect (from the range), and hierarchy of constraints (ordering of factor weights) (Poplack and Tagliamonte 2001:92-3). The hierarchy of constraints yields "the detailed structure of the relationship between variant and context, or the 'grammar' [or phonology, in this paper] underlying the variable surface manifestations" (Poplack and Tagliamonte 2001:94). The comparison of constraint hierarchies across positions allows us to examine the claim that Spanish /s/ reduction is a unitary process extending from preconsonantal to prevocalic positions.

In this section we look at the results of four independent variable rule analyses (Rand and Sankoff 1990), one for each of the four word-syllable positions into which we divided the occurrences of /s/. Factor groups included in the runs were following and preceding phonological environment, relationship to stress in the word, word frequency, morphemic status (for word final /s/), and speaker differences. The application value is the reduced (aspirated and deleted) variants.

[17] Contra the predictions in Figure 1, varieties with high reduction rates syllable finally (e.g., Caribbean, Argentina) are not reported to aspirate syllable initially (though studies of rural varieties might surprise us) (see Brown and Torres Cacoullos, to appear). Andalucía is one region for which both initial and final aspiration has been mentioned.

[18] Lipski's (1999:198) formulation that word initial /s/ reduction generalizes from word final processes is not supported, since preconsonantal word final reduction is lower than prevocalic (Table 2). Thus, word final prevocalic cannot be an analogical extension of word final precononantal reduction.

	Word final				Word medial		
Input:	.44				.16		
Total N:	1116				569		
	%	Factor Weight	% data		%	Factor Weight	% data
Following phonological environment							
liquid	63	.71	6	/r/	75	.98	1
/f,x,y/	52	.63	4				
nasal	54	.61	9	nasal	53	.97	3
/a/	53	.60	9				
pause	54	.57	21				
vd. consonants	50	.55	11	vd. consonants	33	.84	1
other vowels	44	.53	10				
other	37	.36	2				
voiceless stops	28	.31	23	voiceless stops	21	.47	94
/s/	22	.25	4	/s/, /l/	9	.32	2
	Range	*46*			*Range*	*66*	
Preceding phonological environment							
/a/	57	.64	24	/e/	25	.56	71
/o/	45	.49	43	/a/	12	.52	9
/e/	36	.41	31	/i/	34	.45	6
/u,i,ei/	46	.36	1	/u,o,n/	9	.25	14
	Range	*28*			*Range*	*31*	
Morphemic Status							
verbal (2nd sg)	58	.67	4				
non-morphemic	45	.54	52				
plural marker	44	.44	45				
	Range	*23*					
Stress							
unstressed	53	.59	20	pre-tonic	27	.63	61
post-tonic	46	.53	49	stressed	13	.33	31
stressed	38	.39	31	unstressed	13	.22	8
	Range	*20*			*Range*	*41*	
Word Frequency							
high (>2 tokens)	47	.52	82	high	23	.51	88
low (1-2 tokens)	37	.42	18	low	12	.43	12
	Range	*10*					

Word-final: Chi-square/cell = 1.2169, Log likelihood = -670.235, p = .000; Word-medial: Chi-square/cell = .7448, Log likelihood = -252.349, p = .008. Also selected: speaker differences.

Table 3. Variable rule analyses of the contribution of phonological and lexical factors to the probability of syllable final /s/ reduction, in word-final and word medial position (factors selected as significant in bold).

Table 3 shows the results for word final and word internal/syllable final /s/. Following phonological environment is the most important constraint on /s/ aspiration and deletion, with a range of 46 word finally and 66 word medially. The direction of effect is the same for both positions, with reduction most favored by a following liquid, as in *Israel* and *es lo* 'is what', a nasal, as in *mismo* 'same', and by other voiced consonants, as in *vamos de* 'go from'. Voiceless stops, which make up 23% of the data word finally and 94% word internally (overwhelmingly /t/), disfavor reduction. The conserving effect of voiceless stops might help explain the lower rates of reduction word internally/syllable finally in this corpus (but see below).

The remaining phonological factors do not line up the same way word finally and medially. Preceding phonological environment has a greater effect than stress word finally; the order is reversed word medially. Within these factor groups, the constraint hierarchies are not identical, either. Word finally, preceding /a/ is most favorable to /s/ reduction and mid vowels /o/, /e/ are more favorable than high vowels. Word medially, preceding /e/ is most favorable (and makes up 71% of the data) and back vowels, both /u/ and /o/, as well as the few tokens of preceding nasals, as in *instante*, disfavor reduction. In the stress factor group, word finally reduction is favored in unstressed position, as in the articles *los, las* and object clitic *nos*, and post-tonic syllables, as in *entonces* 'then', *Juárez, todos* 'all'; word medially pretonic position is most favorable, as in *está* 'is (there)'.[19]

Word frequency appears to have a consistent effect, with high frequency words favoring reduction in both positions, as predicted in the usage-based model of phonology advanced by Bybee (2001). Articulatorily motivated reductive changes affect high frequency before low frequency words: sound change occurs in real time as language is used and lexical items that are more frequently used have more of an opportunity to be altered.

Nevertheless, the word medial data is highly skewed.[20] The six most frequent word types, shown in Table 4, make up 69% of the data and 87% of reduced tokens. They do not behave uniformly, however. Neither lexical frequency nor phonological context show consistent effects across these words. *Estar* 'to be (located)' alone makes up 39% of all the medial data (and 61% of all reduced tokens). Forms of *estar* have an overall reduction rate of 34%. In contrast, tokens of *éste/-a/-o* 'this', which is the second most

[19] Although in the morphemic status group (Table 3) the 2nd person singular marker apparently favors reduction more than either plural or non-morphemic /s/, it makes up a scarce 4% of the data and 42% of reduced tokens come from the verb or discourse marker *ves, verás* 'you see'.

[20] Lexical skewing may contribute to the mismatch between the percentages and Varbrul weights in the preceding phonological environment group (Table 3).

frequent word type with 12% of the data and has the same /est/ sequence, show only 11% reduction. Stress is not a consistent predictor, either. In an earlier variable rule analysis including individual word types, *mismo* 'same' and *después* 'after' highly favored reduction, while *hasta* 'until, including' and *usted* 'you' disfavored. These words do not pair up with respect to stress: *Mismo* and *hasta* both have a tonic /s/, while *después* and *usted* are pretonic. Low reducers *hasta*, *usted*, and *este* do have in common a following /t/; yet *estar*, also with a following /t/, has a relatively high reduction rate. The high reduction rate for *estar* could be adduced in support of lexical frequency effects, but note that *mismo*, with only 2% of the data, shows more than double the rate of reduction, at 80%.

Lexical type	% reduction	N	% data	% all reduced tokens
mismo 'same'	80%	10	2%	6%
después 'after'	46%	13	2%	5%
estar 'be (located)'	34%	223	39%	61%
hasta 'until'	18%	28	5%	4%
este/a 'this'	11%	70	12%	6%
usted 'you'	13%	48	8%	5%
		392	69%	87%

Table 4. Reduction rates in word internal syllable final position

Let us now turn to syllable initial (prevocalic) /s/. Table 5 shows the results of separate variable rule analyses for word initial and word internal occurrences. In contrast with the primacy of following phonological environment for syllable final /s/ (Table 3), the greatest effect on syllable initial /s/ variation is the preceding phonological environment, with a range of 61 word initially and 72 word medially. The direction of effect is similar word initially and internally, though the relative magnitude of effect of the remaining factor groups is not the same. Preceding low and mid vowels are more favorable to reduction than high vowels, though /a/ is ordered above /e/ in word initial position. For following environment, reduction is more favored by following mid vowels /o/,/e/ than following /a/ and /i/. In the word stress factor group, unstressed and pre-tonic syllables are more favorable than stressed syllables, though stress was not selected word internally, with nearly identical rates for stressed, unstressed, pre-, and post-tonic.

In the word frequency group, higher frequency words again show higher reduction rates than low frequency items. Nevertheless, as with word internal/syllable final /s/ (Table 4), there is not a one-to-one correspondence between token frequency and rate of aspiration. Table 6 lists in descending order the 13 word types with the highest token frequency and the 13 word

	Word initial				Word medial		
Input:	.15				.28		
Total N:	1044				1110		
	%	Factor Weight	% data		%	Factor Weight	% data
Preceding phonological environment							
/a/	34	**.70**	*10*	*diphthong*	57	**.89**	*1*
pause	30	**.65**	33	/e/	41	**.58**	31
/e/	25	**.60**	11	/a/	39	**.56**	32
/o/	14	**.43**	20	/o/	40	**.54**	9
/i/	11	**.36**	8	/i/	25	**.39**	8
/u/	100	K.O.	0	/u/	19	**.27**	3
diphthongs	100	K.O.	0				
/s/	10	**.32**	8				
liquid	8	**.25**	5				
nasal	3	**.16**	3	nasal	19	**.34**	12
other	3	**.09**	3	non-nasal cons.	4	**.17**	4
	Range 61				*Range 72*		
Following phonological environment							
/o/	20	.63	4	/o/,/u/	42	**.57**	19
/e/	20	.52	36	/e/	34	**.55**	29
/i/	25	.52	39	/a/	35	**.49**	21
/a/	23	.50	12	/i/	34	**.45**	22
/u/, diphthong	6	.29	10	/ie/	15	**.34**	8
					Range 23		
Stress							
pre-tonic	27	**.72**	16	un-stressed	38	.57	2
unstressed	20	**.60**	28	pre-tonic	33	.56	5
stressed	19	**.39**	56	stressed	35	.51	38
	Range 33			post-tonic	34	.49	55
Word Frequency							
high (>2 tokens)	22	.51	95	high	37	**.52**	87
low (1-2 tokens)	9	.28	5	low	15	**.36**	13
					Range 16		

Word-initial: Chi-square/cell = 1.1760, Log likelihood = -442.321, p = .000;
Word-medial: Chi-square/cell = 1.0334, Log likelihood = -532.590, p = .045.
Also selected: speaker differences.

Table 5: Variable rule analyses of the contribution of phonological and lexical factors to the probability of syllable initial /s/ reduction, in word-initial and word medial position (factors selected as significant in bold)

types with the highest aspiration rates, including verbs *pasar* 'pass', *conocer* 'know', *decir* 'say', and *sacar* 'take out'; nouns *veces* 'times' and *señor* 'mister, man'; distal demonstrative *ese*; and adverb *casi* 'nearly'. There is some overlap between the two lists (words in bold), for example, ***hacer*** 'to do' is a high aspirating word and a highly frequent verb, but ***sí*** 'yes', the single most frequent word, is last on the list of aspirating words. More than half of the most highly aspirating words are not even on the list of the most frequent words.

13 most frequent words	Tokens	13 highest aspiration rates		Tokens
sí	306	*nosotros*	81%	27
se	227	suffix *-cito*	73%	15
ese, esa, esos, esas	141	***pasar***	58%	43
hacer*	102	*casi*	56%	10
sea	77	*veces*	52%	21
así	72	***hacer***	40%	102
entonces	53	*conocer*	39%	18
Si	45	*señor*	38%	26
decir*	44	*empezar*	36%	14
pasar*	43	***ese/a(s)***	34%	141
casa(s)	43	***decir***	34%	44
*salir**	35	*sacar*	30%	27
*Ser**	30	***sí***	29%	306

*Types with different inflected forms; bolded words are common to both lists.

Table 6. Syllable-initial /s/: Most frequent word types and word types with highest aspiration rates

In summary, the comparison of rates and constraint hierarchies fails to provide evidence for a unitary process extending from syllable final to syllable initial position. It seems that Spanish /s/ reduction may be a case of (at least) two different phonological variables rather than one, with characteristics of not only the classic "Spanish" type, but also with affinities to the "Greek" type. To further explore differences and similarities we look at one environment which could be defined as a common variable context: intervocalic position.

5 Intervocalic /s/ Reduction

A close examination of the weights for preceding phonological environment in Tables 3 and 5 reveals that, in all positions, we have a common preceding vowel hierarchy, with low and central vowels more favorable to reduction

than high vowels. In Table 7 we combine in a single variable rule analysis all cases of intervocalic /s/ across the three word positions—word initial, as in *una señora* 'a woman', word internal, as in *pasa* 'happens', and word final as in *vamos a* 'go to'. In limiting the variable context to intervocalic occurrences, we eliminate syllable position as a factor since word final prevocalic /s/ resyllabifies in Spanish.

Input: .34, Chi-square/cell = 1.2513,Log likelihood = -987.275, p =.000

Total N: 1876	%	Factor weight	% data		
Phonological environment					
a__a, e, o, u	51%	.65	20%		
o__a, o, u	55%	.63	12%		
e__a,e,i,o	41%	.53	29%		
a__i, iV	32%	.48	10%		
o__e,i	23%	.35	15%		
e__u, iV	20%	.33	3%		
i__V	18%	.32	10%		
u__V	18%	.24	2%	*Range*	*41*
Word position					
final (*vamos a*)	58%	.69	23%		
internal (*pasa*)	38%	.51	49%		
initial (*una señora*)	20%	.33	28%	*Range*	*36*
Stress					
unstressed	41%	.55	62%		
stressed	32%	.43	38%	*Range*	*12*
Lexical frequency					
highest (>100 tokens)	39%		31%		
higher (30-77 tokens)	35%		28%		
high (10-28 tokens)	41%		14%		
mid (3-9 tokens)	38%		17%		
low (1-2 tokens)	37%		10%	*n.s.*	

Table 7. Variable rule analysis of the contribution of phonological and lexical factors to the probability of intervocalic /s/ reduction (factor groups selected are bolded)

There is an apparent word position effect, with reduction most favored in word final, then word internal, and lastly word initial position. However, the word position effect may be an epiphenomenon of stress and phonological environment. Table 8 shows a cross-tabulation of word stress with word position. The distribution of the positions with respect to stress (% columns) is different: the proportion of unstressed occurrences is higher word

finally (72%) than word medially (60%) or initially (57%). That is, word final prevocalic /s/ is more likely to be unstressed than either word internal or word initial /s/. Table 8 also shows that the magnitude of the stress effect on reduction (% reduction columns) is different in each position: greatest word initially, less word finally, and nil word medially. This agrees with the variable rule analyses (Table 3,5), where the stress factor group showed a relatively high range for word initial, a relatively smaller range for word final, and not selected for word internal position.

	Word initial		Word medial		Word final	
	%	% reduction	%	% reduction	%	% reduction
Unstressed	57%	29%	60%	38%	72%	60%
Stressed	43%	8%	40%	39%	28%	53%
N	521		922		433	

* The proportion of word final unstressed occurrences in higher than medial (Chi-square = 16.28199, p =.0001) and initial (Chi-square = 20.66582, p.= .0000) unstressed occurrences.

Table 8. Cross-tabulation of stress with word position, intervocalic /s/

Word position also interacts with phonological context. Table 9 shows the distribution of 23 intervocalic contexts that showed variation in the realization of /s/ by word position. First, about half the intervocalic data are word medial, with the remainder distributed about evenly between word initial and final position (see also % data column for word position in Table 7). Second, the occurrence of particular intervocalic contexts is skewed with respect to word position. For instance, as shown in the left half of Table 9, o_e is overwhelmingly word initial, at 69%; o_u and o_a are overwhelmingly word final, at 75% and 73%, respectively; and ten contexts occur over 60% of the time in word medial position, including o_o, e_o, and a_e,o,i. Six contexts do not occur word finally at all, including i_e.

As with stress, this skewed distribution of intervocalic contexts may be related to the different rates of reduction in each word position. The six contexts that do not occur in word final position (see 0s in '% final' column) involve high vowels or diphthongs and are all toward the bottom of the list, that is, they disfavor reduction. On the other hand, of the ten most favorable contexts, as indicated by a higher than average overall reduction rate in the last column, two (o_u and o_a) overwhelmingly occur word finally. The

remaining eight most favorable contexts are most likely to occur word medially. None have a higher than average occurrence in word initial position, except for a_e, as in feminine article and noun combinations (e.g., *la señora*).

	% initial (N=521)	% medial (N=922)	% final (N=433)	% data	N	% init. red.	% med. red.	% fin. red.	% tot. red.
o_u	25	0	75	1	20	0	NA	87%	65%
a_a	11	54	34	8	151	59%	45%	73%	56%
o_a	13	15	73	8	151	37%	32%	65%	56%
a_u	25	50	25	1	24	50%	42%	50%	56%
o_o	15	62	23	3	62	11%	61%	57%	52%
a_e	32	45	23	8	144	41%	45%	73%	50%
e_e	22	58	19	10	195	44%	34%	47%	41%
e_a	19	51	30	9	165	22%	44%	49%	41%
e_o	4	86	9	5	95	25%	43%	33%	41%
a_o	15	65	20	3	60	22%	38%	58%	40%
e_i	25	63	12	4	83	5%	58%	10%	39%
u_iV	0	100	0	0	8	NA	38%	NA	38%
a_i	10	81	9	9	168	6%	33%	67%	33%
e_u	42	13	46	1	24	20%	67%	36%	33%
u_o	17	83	0	0	6	0%	40%	NA	33%
i_o	26	74	0	1	23	0%	35%	NA	26%
o_i	43	17	40	1	25	4%	30%	46%	25%
a_iV	38	72	0	1	25	0%	33%	NA	24%
o_e	69	10	21	11	204	14%	25%	50%	23%
i_e	62	38	0	4	78	15%	30%	NA	21%
i_i	52	46	2	3	48	12%	32%	0%	21%
u_a	14	79	7	1	14	0%	9%	100%	14%
e_iV	23	77	0	1	26	0%	10%	NA	8%
Overall:	28%	49%	23%		1799	20%	38%	58%	38%

Table 9. Distribution of intervocalic contexts for /-s-/ by word position. Reduction rates in intervocalic contexts. (Contexts listed in descending order of reduction rates).

The intervocalic contexts generally do not have a uniform effect on reduction across word positions, as shown in the second half of Table 9. For example, o_a has higher than average reduction rates word initially and word finally, but not word medially. Nor is the pairing up of the word positions the same for reduction-favoring intervocalic contexts. For example, while word initial and final pair up in the o_a context just mentioned, e_e favors reduction in word initial alone and a_i favors reduction in word final alone. The only generalization is that word initial and word final sometimes pair up (o_a), initial and medial sometimes pair up (e_o), but never medial and final.

However, two intervocalic contexts stand out, underlined in Table 9. a_a and a_e favor reduction in all three positions, as indicated by higher than

average reduction rates. They also have relatively high overall reduction rates, 56% and 50%, respectively, and both are frequent, each accounting for 8% of all the data.

Intervocalic context effects may be related to lexical and chunking patterns. This is not a strictly lexical frequency effect, since in the variable rule analysis word frequency was not selected nor is the ordering of reduction rates consistent (Table 7). Furthermore, as we saw, there is not a one-to-one relationship between lexical frequency and rate of reduction (Table 6). Rather, relatively higher reduction rates appear in certain lexical items and combinations, and these correspond to certain phonotactic patterns. For example, the highly favorable o_u context is largely made up of first person plural *hacer* 'do, make' and indefinite article *un, una* combinations, as in *hacíamos una*. The a_a context has the chunk *gracias a* 'thanks to': more than three-quarters of *gracias* tokens were followed by *a*, with a reduction rate of 86%. On the other hand, the o_e context disfavors reduction: at least half of the word initial o_e occurrences were in the word chunk *Bendito sea Dios* 'bless god' and the discourse marker *o sea*, which show a near zero reduction rate. Thus, if we expand our view of lexical units to include frequent phrases or chunks, we may be able to examine better the intersection between lexical and phonological effects.

In sum, even when we consider the data in a shared variable context by including only intervocalic occurrences, we find a skewed distribution of the word positions with respect to stress and phonological context. Word position effects in intervocalic context, with favoring contexts ordered word final > word medial > word initial position, are at least in part due to the skewed distributions of word position with respect to word stress and intervocalic environment. More importantly the effect of stress and phonological context is not the same across positions. These skewed distributions and differential effects argue against a unitary reduction process spreading from word final to medial and initial position.

References

Brown, Dolores. 1993. El polimorfismo de la /s/ explosiva en el noroeste de México. *Nueva Revista de Filología Hispánica* 41:1. 159-176.

Brown, Esther L. and Rena Torres Cacoullos. (to appear). Spanish /s/: A different story from beginning (initial) to end (final). In Nunez-Cedeno et. al. (Eds.) *Proceedings from the 31st Linguistic Symposium on Romance Linguistics*.

Bybee, Joan. 2001. *Phonology and Language Use*. Cambridge: Cambridge University Press.

78.
Lipski, John M. 1999. The many faces of Spanish /s/-weakening: (re)alignment and ambisyllabicity. In Javier Gutiérrez-Rexach and Fernando Martínez-Gil (eds.), *Advances in Hispanic Linguistics. Papers from the 2nd Hispanic Linguistics Symposium, Vol I.* Somerville, MA: Cascadilla Press.
Méndez Dosuna, Julián. 1996. Can Weakening Processes Start in Initial Position? In Bernhard Hurch and Richard Rhodes (eds.) *Natural Phonology: The State of the Art.* New York: Mouton de Gruyter. 97-106.
Penny, Ralph. 2000. *Variation and Change in Spanish.* Cambridge: Cambridge University Press.
Poplack, Shana and Tagliamonte, Sali. 2001. *African American English in the Diaspora.* Oxford: Blackwell.
Rand, D. and Sankoff, D. 1990. *GoldVarb. A Variable Rule Application for the Macintosh,* Version 2. Montreal: Centre de researches mathématiques, Université de Montréal.
Terrell, Tracy. 1977. Constraints on the Aspiration and Deletion of Final /s/ in Cuban and Puerto Rican Spanish. *The Bilingual Review* 4. 35-51.
Terrell, Tracy. 1978. La aspiración y elisión de /s/ en el español porteño. *Anuario de Letras* 16. 41-66.
Terrell, Tracy. 1979. Final /s/ in Cuban Spanish. *Hispania* 62. 599-612.

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