



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

/s/-lenition and resyllabification in Southern Cone Spanishes

Citation for published version:

Marchini, G & Ramsammy, M 2023, /s/-lenition and resyllabification in Southern Cone Spanishes. in R Skarnitzl & J Volín (eds), *Proceedings of the 20th International Congress of Phonetic Sciences.*, 562, Guarant International, Prague, pp. 2144-2148, 20th International Conference of Phonetic Sciences (ICPhS), Prague, Czech Republic, 7/08/23. <<https://guarant.cz/icphs2023/562.pdf>>

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Proceedings of the 20th International Congress of Phonetic Sciences

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



/S/-LENITION AND RESYLLABIFICATION IN SOUTHERN CONE SPANISHES

Gilly Marchini, Michael Ramsammy

University of Edinburgh

G.E.M.Marchini@sms.ed.ac.uk, m.ramsammy@ed.ac.uk

ABSTRACT

This paper presents experimental results on the interaction between word-final /s/-lenition and vowel reduction in Spanish. Data from 6 speakers of Southern Chilean Spanish (SCS) and 5 speakers of Buenos Aires Spanish (BAS) were analysed. Results show that final debuccalisation to [h] (i.e. /s/-*aspiration*) both shortens preceding vowels and the fricative itself in both dialects. Our data further highlight that, with both [s] and [h]-allophones of /s/, vowel and /s/-durations in the /Vs#V/ context are not significantly different from /Vs#C/ in either dialect. However, realisations of /Vs#V/ do show significant durational reduction in comparison to /V#sV/ in both SCS and BAS.

Despite established theoretical claims about the operation of phrasal resyllabification in Spanish, our data therefore suggest that /s/ in the /Vs#V/ environments behaves as though it remains in canonical coda position word-finally. Consequently, our findings contribute to growing scholarship disputing the categorical nature of resyllabification in Spanish.

Keywords: Vowel reduction, /s/-debuccalisation, Southern Cone Spanish

1. INTRODUCTION

This study analyses word-final /s/-lenition in Southern Chilean Spanish (SCS) and Buenos Aires Spanish (BAS) on the basis of a corpus of spontaneous speech recordings. Background on /s/-lenition is provided in §2, and the methods employed in the study are outlined in §3. We analyse the effect of aspiration and elision on preceding vowel duration (§4.1) prior to examining the interaction of /s/-lenition and vowel shortening with syllabic affiliation (§4.2). We compare vowel and /s/-duration in canonical coda position (i.e., /Vs#C/) with realisations in which /s/ remains in canonical onset position (i.e., /V#sV/) and those in which it is said to resyllabify across a word boundary as a *derived onset* (i.e., /Vs#V/). The discussion in

§5 focuses on evidence for dialect-specific phrasal resyllabification operations in Spanish.

2. BACKGROUND

2.1. /s/-lenition

Southern Cone Spanishes are a group of dialects spoken in the southern tip of South America sharing several features, including /s/-lenition [1]. This is a phonological process that causes /s/ to display some degree of phonetic weakening in syllable-final contexts. For example, in *conos* ('cones'), /s/ may be retained as [s] in more formal speech (i.e., [ˈko.nos]). Elsewhere, it may aspirate to [h] ([ˈko.noh]) or completely elide ([ˈko.no∅]). Lenition patterns vary cross-dialectally: advanced lenition varieties, such as Caribbean and Peninsular Spanish dialects, routinely elide /s/ [2, 3]. By contrast, semi-conservative varieties, such as Southern Cone Spanishes, may favour aspiration [1, 4].¹ This occurs both with inflectional /s/, as in *conos*, and /s/ in monomorphemes, like *lunes* 'Monday'.

Particularly pertinent to the present study are the effects of /s/-lenition on preceding vowels. In Eastern Andalusian Spanish, mid and low-vowels (/e, a, o/) in contact with elided /s/ open and lax [5, 6] with regressive harmony effects noted for bisyllabic words containing two mid vowels (e.g., *conos*, [ˈkɔ.nɔ∅]) [5]. In contrast, shortening and centralisation effects are observed in Caribbean Colombian Spanish: e.g., [ˈko.nə∅] [6]. In Cuban Spanish, word-final /s/-elision has no observable effect on surrounding vowels, whereas word-medial /s/-elision triggers lengthening of preceding vowels [7, 8]: e.g., *bosque* [ˈbo:∅.ke], 'forest'.

Whilst similar dialect-specific patterns are noted in other advanced varieties (e.g., Western Andalusian Spanish [9], Puerto Rican Spanish [10, 2] and Dominican Spanish [3]), research on Southern Cone varieties is scarce. Regarding SCS, Bolyanatz [11, 12] showed that qualitative and/or quantitative vowel alternations are dependent on key social factors (e.g., gender, age). For BAS, impressionistic analysis from Honsa [13]

indicates that when plural /s/ elides, mid and low vowels lengthen and lax to disambiguate otherwise homophonous singular items: e.g., *cono* [ˈko.no] vs *conos* [ˈko.no:Ø]. However, the occurrence of this pattern has not been verified through acoustic analysis.

Thus, existing research has focused overwhelmingly on the effects of /s/-elision in advanced varieties such that similar effects in Southern Cone varieties have typically only been discussed in impressionistic terms. Furthermore, the effects of aspiration on vowel and /s/-duration as an intermediary step towards elision have not yet been explored. With the exception of Bolyanatz [11, 12], analyses have focused on lenition in controlled speech, such that the question of whether similar effects occur in spontaneous speech—where lenition is said to be most commonly observable [4]—remains to be addressed. It is also unclear how lenition effects may interact with other phonological processes targetting syllable-final consonants, particularly phrasal resyllabification.

2.2. Resyllabification

Phrasal resyllabification is the process in which word-final consonants in Spanish are said to relocate to occupy the onset position of a following vowel-initial word: e.g., /las#alas/ → [la.'sa.lah] ‘the wings’. It has been argued that phrasal resyllabification operates pan-dialectally in Spanish [1, 14]. Thus, resulting derived onsets are predicted to be phonetically indistinguishable from canonical onsets: cf. /Vs#sV/, as in [la.'sa.la] ‘the room’, versus /Vs#V/, as in [la.'sa.lah] ‘the wings’.

However, there is increasing scholarship that disputes these claims. Of particular relevance is Strycharczuk and Kohlberger [15], who showed that in Peninsular Spanish, /s/ in derived onset (/Vs#V/) environments is durationally distinct from /s/ in both canonical coda (/Vs#C/) and onset position (/Vs#sV/). This suggests that derived onsets may form their own unique phonetic category (see §5). Although there has been some phonetic investigation on /s/-allophony in Southern Cone varieties [4, 11, 12], no research to date has closely examined the putative outcomes of resyllabification on the basis of spontaneous speech data.

2.3. Research questions

Given the paucity of research into /s/-lenition and resyllabification in Southern Cone Spanishes, this paper focuses on the following questions:

RQ1. What are the durational consequences

of /s/-lenition on word-final /s/-realisations and preceding vowels in SCS and BAS?

RQ2. How do /s/-realisations and preceding vowels vary durationally in SCS and BAS according to the putative syllabic affiliation of /s/ (i.e., across /Vs#C, Vs#V, V#sV, Vs#sV/ contexts)?

RQ3. To what extent can analysis of spontaneous speech provide wider insights into the dialect-specific operation of /s/-aspiration and phrasal resyllabification in Spanish?

Regarding RQ3, we specifically aim to test whether /s/ in resyllabification contexts (/Vs#V/) patterns phonetically with canonical onsets (/Vs#sV/), as is predicted by phrasal resyllabification. By contrast, should vowels and /s/-realisations (either [s] or [h]) in these environments show different durational properties—e.g. greater similarities to /s/ in canonical coda position (/Vs#C/)—this may provide further evidence against the operation of phrasal resyllabification (cf. [15]). Another possibility is that /s/ in resyllabification sites is phonetically distinct from realisations in other phonological environments, thus supporting the existence of a homogeneous third category.

3. METHODS

In accordance with previous work, we restricted our analysis to the realisation of word-final /s/ in the context of preceding mid and low vowels, i.e., /e, a, o/. The high vowels (/i, u/) were excluded from the analysis due to their infrequency in appearing in word-final syllables in Spanish. We analysed realisations of /s/ in the following environments: word-final pre-vocalic /Vs#V/ (*cosas o* ‘things or’); word-initial pre-vocalic /Vs#sV/ (*cosa suya* ‘her/his thing’); pre-consonantal /Vs#C/ (*cosas que* ‘things that’); pre-pausal /Vs###/ (*cosas ##*); false geminate /Vs#s/ (*cosas son* ‘things are’). Tokens with diphthongs or long vowels derived by /s/-elision (e.g., *cosas y* → [ˈko.saj] ‘things and’; *cosas así* → [ˈko.sa:.'si] ‘things like that’) were also excluded.

The data come from sociolinguistic interviews conducted with 11 speakers of Spanish (6 SCS, 5 BAS) aged between 21 and 37 years old. Participants self-identified as cis-gender male or female, were university-educated and had been born and raised in either Santiago de Chile or Buenos Aires. None reported hearing or speech pathologies. Approximately 35 minutes worth of speech was analysed per speaker totalling 2,765 /s/ tokens. Due to the COVID-19 pandemic, speech was recorded

remotely: we opted to use the video calling platform Zoom due to its accuracy in capturing relevant acoustic information [16, 17]. All participants wore headphones with an integrated microphone to ensure consistent distance from the recording device.

Speech was segmented using the Montreal Forced Aligner [18] and manually corrected. Praat scripts [19] extracted vowel, /s/ and combined rhyme duration (ms). Tokens were coded for dialect (BAS, SCS), vowel (a, e, o), syllabic affiliation of /s/ (canonical coda, canonical onset, derived onset, false geminate), stress context (stressed, unstressed), speaker gender (female, male), following context (pre-pausal, pre-consonantal, pre-vocalic) and /s/-realisation (sibilant, aspirated, elided).

Protocol for coding /s/ was adapted from Rogers [4]: /s/ was considered retained ([s]) when high-intensity frication was observed in the upper frequency regions. [h]-realisations were identified through reduced intensity and more evenly distributed turbulence throughout the lower frequency ranges. /s/ was considered elided where no fricative energy was visible on the waveform or in any spectral regions.

Statistical analysis was carried out in R [20] with plots made using the *ggplot2* package [21]. Linear mixed-effects regression (*lme4* package, [22]) was used to model the duration data. Post-hoc pairwise comparisons were conducted using estimated marginal means (*emmeans* package) with bonferroni adjustments.

4. RESULTS

4.1. Durational correlates of /s/-lenition

First and foremost, we note that vowels adjacent to [h] are significantly shorter than in contexts where /s/ is realised as [s] or [Ø] ($p < .001$ for all comparisons, dialectal differences n.s.). Thus, durational variation between vowels in [s] and [Ø] contexts varied non-significantly ($t = 1.733, p > .1$).

In order to compare the effect of aspiration on /s/-duration, the data were subset to exclude syllables in which /s/ was elided. In this data subset ($N = 1340$), vowels before [h] in both dialects are significantly shorter than in unlenited contexts ($t = 5.705, p < .001$). Fricative durations in [h]-realisations are also significantly shorter than in sibilant [s] ($t = 13.204, p < .001$). This double shortening effect is therefore visible in overall rhyme duration (cf. Figure 1): [h] rhymes are significantly shorter than [s] rhymes ($t = 11.969, p < .001$). Although segment duration was generally greater in SCS than BAS, differences between the two dialects fail to

reach significance for all measures (vowel, /s/, and rhyme duration; all comparisons $p > .1$).

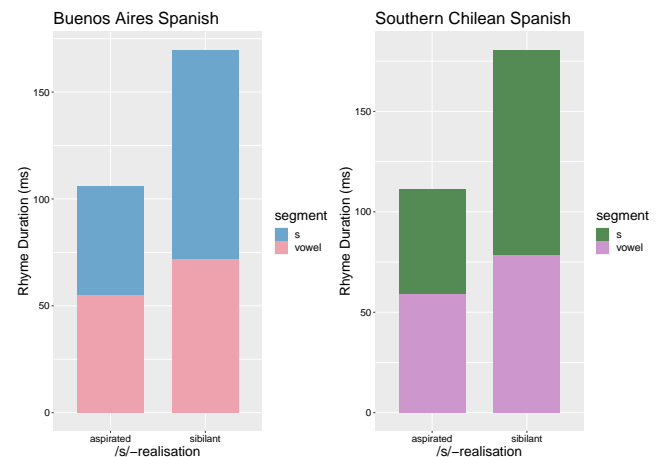


Figure 1: Mean vowel and /s/-durations (values in ms) by /s/-realisation and dialect.

4.2. Syllabic affiliation of /s/

In order to address RQ2, data were subset to include /Vs#C/, Vs#V/ and /Vs#sV/ contexts: pre-pausal tokens were removed from the analysis due to obvious pre-boundary lengthening effects in /Vs##/.

Regarding /s/-duration, [s]-realisations are significantly longer ($p < .01$) in /Vs#s/ than in all other environments except /Vs#V/ ($t = 1.769, p > .1$). [s] in /Vs#V/ is longer than in both /Vs#C/ and /Vs#V/ ($t = -3.253$ and $t = 6.095$ respectively, both $p > .1$), whilst differences between /Vs#C/ and /Vs#V/ did not reach significance ($t = 1.509, p > .1$).

Regarding [h]-realisations, only comparisons between /Vs#C/ and /Vs#V/ were possible due to the infrequency of aspiration outwith these contexts. However, results again reveal non-significant variation between these environments ($t = 1.509, p > .1$). Comparisons between aspirated and sibilant tokens in /Vs#C/ and /Vs#V/ reveal that, in both contexts, [h]-realisations are consistently shorter than [s]-realisations (both $p < .001$). Comparisons between the two dialects were non-significant across all conditions (all $p > .1$).

Similar trends are observed for vowel duration. Vowels preceding [s] in /Vs#s/ and /Vs#V/ are significantly longer than those in /Vs#C/ and /Vs#V/ (all $p < .01$). Thus, vowel duration varies non-significantly between /Vs#s/~Vs#V/ and /Vs#C/~Vs#V/ pairs (both $p > .1$). Comparisons between aspirated realisations of /Vs#C/ and /Vs#V/ failed to reach significance ($t = -1.697, p$

>.1). Again, across all conditions, vowels preceding [h] are significantly shorter than vowels preceding [s] (all $p <.001$) whilst comparisons between dialects are non-significant ($p >.1$).

Our results therefore confirm that vowels and /s/-realisations (whether lenited or not) pattern similarly in /Vs#V/ and /Vs#C/. By comparison, significantly longer vowel and /s/-realisations are observed in /V#sV/.

dialect	s-type	syllable context	vowel dur.	/s/ dur.	rhyme dur.
BAS	[s]	/Vs#C/	84.45	106.57	191.02
		/Vs#s/	60.77	87	147.77
		/V#sV/	59.2	93.89	153.1
		/Vs#V/	68.72	85.15	153.88
	[h]	/Vs#C/	56.82	53.27	110.09
		/Vs#V/	55.7	57.23	112.93
SCS	[s]	/Vs#C/	79.89	107.51	187.39
		/Vs#s/	62.42	106.85	169.27
		/V#sV/	59.86	95.9	155.77
		/Vs#V/	71.44	81.94	153.38
	[h]	/Vs#C/	56.83	51.87	108.7
		/Vs#V/	61.8	50.32	112.12

Table 1: Mean vowel, /s/ and rhyme duration (values in ms) for BAS and SCS according to /s/-realisation and syllabic affiliation.

5. DISCUSSION

In answer to RQ1, the data show that aspiration significantly shortens word-final /s/ and preceding vowels in both SCS and BAS: in other words, /s/-lenition compresses the entire rhymal unit. By contrast, /s/-elision has no significant effect on preceding vowel duration in either dialect. Although SCS and BAS behave similarly, the observed patterns are distinct from those reported for other /s/-leniting dialects. Our findings therefore concur with the general observation that the phonetic outcomes of /s/-lenition are dialect-specific.

Regarding RQ2, word-final /s/ and vowel durations in the derived onset environment (/Vs#V/) did not vary significantly from measurements extracted from canonical coda /s/ (/Vs#C/). However, the durations of /s/ and preceding vowels in canonical onset position are significantly longer than both /Vs#V/ and /Vs#C/. With reference to RQ3, these findings suggest that so-called derived onsets are not durationally identical to canonical onsets, nor do they form their own unique category in these varieties. Rather, in spite of theoretical

claims about the alleged exceptionless operation of phrasal resyllabification in Spanish, our findings are consistent with the assumption that /s/ remains in the coda in /Vs#V/. Accordingly, the data provide no positive evidence that phrasal resyllabification operates in these dialects.

These findings echo previous studies that highlight the non-categorical, dialect-specific nature of resyllabification in Spanish. For example, in advanced varieties of Caribbean Spanish, word-final, pre-vocalic /s/-aspiration may occur despite resyllabification. Kaisse [23] therefore suggests that word-final /s/ continues to behave (i.e., aspirate) as if it were in canonical coda position and thus that resyllabification may simply not apply in these environments. In Highland Ecuadorian Spanish, resyllabification varies according to the phonetic realisation of the sound: Robinson [24] showed that word-final, pre-vocalic [n] and [s] were always judged as onsets by native speakers, whilst [ŋ] and [z]-allophones in the same environments were judged as codas. As mentioned, Strycharczuk & Kohlberger [15] showed that in Peninsular Spanish, derived onset /s/ formed its own unique category from both canonical coda and onset /s/, suggesting that this variety may indeed evidence incomplete resyllabification across word boundaries.

In light of these facts, our findings present additional evidence that phrasal resyllabification varies cross-dialectally. Specifically, durational data extracted from unmonitored spontaneous speech do not support the claim that coda /s/ resyllabifies in word-final pre-vocalic contexts.

6. CONCLUSION

This study shows that /s/-aspiration—but not elision—shortens vowels in word-final syllables in both SCS and BAS. Shortening affects not only the fricative but the entire rhymal unit: as a whole, [Vh]-rhymes are consistently shorter than [Vs]-rhymes in both dialects under consideration. Furthermore, final /-Vs/-syllables in putative resyllabification contexts behave as rhymes: i.e., /s/ patterns like a canonical coda. This is to say that final /-Vs/-syllables are significantly shorter than /V#s/ sequences containing a canonical onset. Despite potential methodological limitations of remote data collection using Zoom and the necessity to exclude certain sequences of interest from the analysis (derived diphthongs and long vowels), we conclude that the predictions of phrasal resyllabification are not borne out by our spontaneous-speech data from SCS and BAS.

7. REFERENCES

- [1] J. I. Hualde and S. Colina, *Los sonidos del español*. Cambridge: Cambridge University Press, 2014.
- [2] S. Poplack, “The notion of the plural in Puerto Rican Spanish: Competing constraints on (s) deletion.” in *Locating Languages in Time and Space*, W. Labov, Ed., 1980, pp. 55–67.
- [3] T. Terrell, “La desaparición de /s/ posnuclear a nivel léxico en el habla dominicana,” in *Estudios sobre el español del Caribe*, R. Nuñez Cadeño, I. Paez Urdaneta, and J. Guitart, Eds. Caracas: Casa de Bello, 1986, pp. 117–134.
- [4] B. M. Rogers, “The state of Spanish /s/ variation in Concepción, Chile: Linguistic and social trends,” *Open Linguistics*, vol. 6, no. 1, pp. 132–153, 1 2020.
- [5] N. Henriksen, “Patterns of vowel laxing and harmony in Iberian Spanish: Data from production and perception,” *Journal of Phonetics*, vol. 63, pp. 106–126, 7 2017.
- [6] M. A. Rincón Perez, “An acoustic and perceptual analysis of vowels preceding final /-s/ deletion in the speech of Granada, Spain and Cartagena, Colombia.” Ph.D. dissertation, Purdue University, 2015.
- [7] M. C. Resnick and R. M. Hammond, “The status of quality and length of Spanish vowels,” *Linguistics: An Interdisciplinary Journal of Language Sciences*, vol. 13, no. 156, pp. 79–88, 1975.
- [8] R. M. Hammond, “An experimental verification of the phonemic status of open and closed vowels in Spanish,” Ph.D. dissertation, Florida Atlantic University, 1978.
- [9] K. M. Carlson, “An Acoustic and Perceptual Analysis of Compensatory Processes in Vowels Preceding Deleted Post-Nuclear /s/ in Andalusian Spanish,” *Concentric: Studies in Linguistics*, vol. 38, no. 1, pp. 39–67, 2012.
- [10] N. Figueroa, “An acoustic and perceptual study of vowels preceding deleted post-nuclear /s/ in Puerto Rican Spanish,” in *Hispanic linguistics at the turn of the millennium: papers from the 3rd Hispanic linguistics symposium*, H. Campos, E. Herburger, A. Moreales-Front, and T. J. Walsh, Eds. Somerville, MA: Cascadilla Press, 2000, pp. 66–79.
- [11] M. Bolyanatz, “Plural production in Santiago Spanish,” Ph.D. dissertation, University of California, Los Angeles, 2017.
- [12] M. A. Bolyanatz, “Evidence of Incomplete Neutralization in Chilean Spanish,” *Phonetica*, vol. 77, pp. 107–130, 2018.
- [13] V. Honsa, “The phonemic systems of Argentinian Spanish,” *Hispania*, pp. 275–283, 1965.
- [14] R. Bermúdez-Otero, “Cyclicity,” in *The Blackwell companion to phonology*, M. van Oostendrop, C. J. Ewen, E. Hume, and K. Rice, Eds. Malden, MA: Wiley-Blackwell, 2010, pp. 2019–2048.
- [15] P. Strycharczuk and M. Kohlberger, “Resyllabification Reconsidered: On the Durational Properties of Word-Final /s/ in Spanish,” *Laboratory Phonology: Journal of the Association for Laboratory Phonology*, vol. 7, no. 1, 2016.
- [16] V. Freeman and P. De Decker, “Remote sociophonetic data collection: Vowels and nasalization over video conferencing apps,” *The Journal of the Acoustical Society of America*, vol. 149, no. 2, pp. 1211–1223, 2 2021. [Online]. Available: <https://doi.org/10.1121/10.0003529>
- [17] C. Zhang, K. Jepson, G. Lohfink, and A. Arvaniti, “Comparing acoustic analyses of speech data collected remotely,” *The Journal of the Acoustical Society of America*, vol. 149, no. 6, pp. 3910–3916, 6 2021. [Online]. Available: <https://doi.org/10.1121/10.0005132>
- [18] M. McAuliffe, M. Socolof, S. Mihuc, M. Wagner, and M. Sonderegger, “Montreal Forced Aligner: Trainable Text-Speech Alignment Using Kaldi,” 2017.
- [19] P. Boersma and D. Weenik, “Praat: doing phonetics by computer,” 2021.
- [20] R Core Team, “R: A language and environment for statistical computing,” Vienna, Austria, 2022.
- [21] H. Wickham, *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York, 2016. [Online]. Available: <https://ggplot2.tidyverse.org>
- [22] D. Bates, M. Mächler, B. Bolker, and S. Walker, “Fitting Linear Mixed-Effects Models Using lme4,” *Journal of Statistical Software*, vol. 67, no. 1, pp. 1–48, 2015.
- [23] E. M. Kaisse, “Resyllabification precedes all segmental rules. Evidence from Argentinian Spanish,” in *Formal Perspectives on Romance Linguistics: Selected papers from the 28th Linguistic Symposium on Romance Languages (LSRL XXVIII)*, J.-M. Authier, B. Bullock, and L. A. Reed, Eds., 1999, pp. 197–210.
- [24] K. Robinson, “The dialectology of syllabification: A review of variation in the Ecuadorian Highlands,” *Romance Philology*, vol. 66, pp. 132–153, 2012.

¹ When describing Southern Cone varieties, we opt for the term ‘semi-conservative’ over conservative since, although not quite as advanced as those from Southern Spain or the Caribbean, research shows increasingly advanced patterns, particularly for metropolitan, Chilean varieties [4].