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Chilean s-deletion and aspiration: against a Stratal Optimality-Theory account

Sonia Colina*
University of Arizona

ABSTRACT: In Chilean Spanish (Broș 2018, 2019), s-aspiration is an opaque process in which [h], coda realization of /s/, surfaces morpheme internally as expected, but it overapplies in word-final prevocalic position; in absolute word-final position and in word-final preconsonantal position, deletion takes place instead. Broș argues that a Stratal Optimality Theory (OT) account is necessary to explain the data. This paper contends that a simpler, non-serial account of the Chilean data is possible and preferable to a Stratal OT one, due to greater simplicity and strict parallelism, which is more closely aligned with the spirit of OT. Although the verdict is out on whether some degree of serialism is unavoidable in OT, the analysis presented shows that the Chilean data do not offer evidence in favor of a Stratal OT account, as a parallel explanation is possible. The proposed analysis contributes to our understanding of the Chilean data, to our knowledge of aspiration and other opaque phenomena in Spanish, and to the debate on parallelism in OT.

KEYWORDS: Optimality theory; s-aspiration; opacity; Chilean Spanish; Stratal OT.

1. Introduction

Spanish exhibits multiple opaque processes that affect the syllable coda (e.g., velar neutralization, glide consonantization,[1] aspiration) and overapply to onsets as the result of resyllabification (Hualde 1989a, 1991; Colina 2009, among others). Perhaps

[1] Glide consonantization, which turns a glide into a palatal fricative in onset position, is slightly different in that it underapplies when a word-final glide is resyllabified as the onset of a vowel-initial word, e.g., *ley*, *leyes* [lej] [le jes], but [lej] [le.jal.ɣu.na] (Colina 2009).

* ***Corresponding author:*** Sonia Colina. Department of Spanish and Portuguese - Modern Languages, Rm. 554, The University of Arizona, 1423 E. University Blvd. (Tucson, AZ 85721). – scolina@arizona.edu – https://orcid.org/0000-0002-4893-9047

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the most well-known is aspiration, in which [h], coda realization of /s/, can appear in the onset prevocalically across word and prefix boundaries (Colina 1997, 2002, 2011, 2021; Kaisse 1998; Wiltshire 2006; Kaisse & McMahon 2011; Torres-Tamarit 2014), *las alas* [la.ha.lah] 'the wings'. Coda aspiration is of interest to phonological theory because it interacts with morphological processes, which gives rise to interesting patterns of dialectal variation that affect the contexts of overapplication. Additionally, aspiration has attracted the attention of phonologists working in optimality theory due to the challenges posed by opacity for a parallel model of phonology.

This paper focuses on aspiration in Chilean Spanish as described in Broș (2018, 2019). In Chilean Spanish, aspiration surfaces morpheme internally (1a), and in word-final prevocalic position (2b). However, deletion takes place instead in absolute word-final position (1b) and in word-final preconsonantal position (2a). Broș argues for a Stratal Optimality Theory analysis (OT).

Stratal OT (Bermúdez-Otero in preparation, 2006, 2011; Kiparsky 2000) is a version of OT that accounts for morphology/phonology interactions through level segregation along the lines of Lexical Phonology (Kaisse & Hargus 1993; Kiparsky 1982a, b). It has been proposed to address mainly problems of opacity, such as aspiration in Spanish. While critics of Stratal OT argue that it introduces serialism into the phonology, proponents counter that serialism is acceptable as long it is strictly constrained to avoid excessive duplication of levels and constraint rankings. In Stratal OT levels are restricted to three: stem, word, phrase. The output of a level becomes the input to the next one, which could have a different ranking of the constraint hierarchy. Broș argues for a Stratal OT account of the Chilean data convincingly showing that it is superior to Harmonic Serialism (Torres-Tamarit 2014).[2] Although the verdict is out on whether some degree of serialism is unavoidable in OT, I will argue that a simpler, non-serial account of the Chilean data is preferrable to a Stratal OT one, due to greater simplicity and strict parallelism, which is more closely aligned with the spirit of OT. Additionally, the analysis presented here shows that the Chilean data do not offer evidence in favor of a Stratal OT account, as a parallel explanation is possible. The proposed analysis contributes to our understanding of the Chilean data, to our knowledge of aspiration and other opaque phenomena in Spanish, and to the debate on parallelism in OT.

The paper is structured as follows. After this introduction, section 2 contains the data. Section 3 presents the analysis proposed, for words, prefixed forms and phrases. A comparison with existing accounts, primarily Broș (2018), is included in section 4. The paper ends with a summary and conclusions.

2. Data

The Chilean Spanish data that are the object of this study are drawn from Broș (2018, 2019). Many varieties of Spanish present both aspiration and deletion of /s/

[2] Additional partial Stratal OT approaches have been proposed for various dialects of Spanish, sharing some of the same core elements presented by Broș (Kaisse & McMahon 2011).

in a variable way (Lipski 1994). Chilean Spanish differs from these varieties in that /s/ aspiration alternates with deletion in a contextually determined way. [h] surfaces in the coda, morpheme internally (1a), and in word-final prevocalic position (2b). However, deletion takes place instead in absolute word-final position (1b) and in word-final preconsonantal position (2a).

(1) Coda /s/ within the word (Broș 2018, 2019)

(1a) Word-internal /s/

este	[éh.te]	'this'
desde	[déh.de]	'from'
justo	[xúh.to]	'just'
festival	[feh.ti.βál]	'festival'

(1b) Word-final coda /s/ deletion, prepausal

tres	[tɾé]	'three'
mes	[mé]	'month'
meses	[mé.se]	'months'

(2) Word-final coda /s/ across a word boundary (Broș 2018, 2019)

(2a) Deletion before a consonant

tres meses	[tɾé.mé.se]	'three months'
las normativas	[la.noɾ.ma.tí.βa]	'the rules'
tres términos	[tɾe.téɾ.mi.no]	'three aspects'

(2b) Aspiration before a vowel

tres amigas	[tɾé.ha.mí.ɣa]	'three friends' (fem.)
términos económicos	[téɾ.mi.no.he.ko.nó.mi.ko]	'economic terms'
principales estrategias	[pɾin.si.pá.le.heh.tɾa.té.xja]	'principal strategies'

When /s/ belongs to a prefix, the prefix and the base behave as one undivided word, that is, /s/ is realized as [h] in the coda, when it is followed by a consonant-initial base (3a), and as [s], when it is followed by a vowel-initial base, because it is the result of resyllabification to the onset position (3b).

(3) Word-final coda /s/ across a prefix boundary (Broș 2018, 2019)

(3a) Aspiration before a consonant-initial base

descalzar	[deh.kal.sáɾ]	'take off one's shoes'
desconfiar	[deh.koŋ.fiáɾ]	'mistrust'

(3b) /s/ retention before a vowel-initial base

deshecho	[de.sé.tʃo]	'undone'
desilusión	[de.si.lu.sjón]	'disappointment'

The prefixal behavior of Chilean is aligned with that of dialects that have been referred to by Kaisse (1998) as Caribbean II and Rio Negro Argentinian. In contrast, Granada Spanish and a dialectal group known in the literature as Caribbean I (Kaisse 1998; Colina 2002, 2009) exhibit prefixal aspiration also before consonant and vowel-initial bases.

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(4) Word-final coda /s/ across a prefix boundary (Caribbean I and Granada Spanish)

(4a) Aspiration before a consonant-initial base

descalzar	[deh.kal.sáɾ]	'to take off someone's shoes'
desconfiar	[deh.koŋ.fiáɾ]	'to mistrust'

(4b) Aspiration before a vowel-initial base

deshecho	[de.hé.ʧo]	'undone'
desilusión	[de.hi.lu.sjón]	'disappointment'

3. A parallel OT Analysis

As mentioned above, Chilean differs from other Spanish dialects in that it exhibits contextually motivated deletion as well as aspiration. According to Broș (2018), existing aspiration analyses do not work when contextually-governed deletion is introduced, which is the argument proposed to support the need for a Stratal OT account. She further argues that Stratal OT is also necessary to explain the behavior of the prefix-final aspiration in dialects that behave like Granada Spanish. In this section, I present an analysis that demonstrates that Stratal OT is not necessary to explain the Chilean and Granada Spanish data, if one recognizes the preference for deletion over aspiration, along with the need for onset satisfaction across words and variation in the parsing of prefixes.

I examine bases without a prefix first (3.1), including word-internal and across-the-word contexts, followed by prefixed forms (3.2). I will argue that a non-serial account of the Chilean data is also preferable to a Stratal OT one, due to greater simplicity and strict parallelism.

3.1. Forms without prefixes: word-internal and across-the-word contexts

Deletion and aspiration are repair mechanisms used to avoid /s/ in coda position in Chilean Spanish, a well-known restriction across Spanish dialects. Aspiration is analyzed as the deletion of the supralaryngeal node, in accordance with standard autosegmental analyses of the phenomenon in Spanish which interpret [h] as a placeless consonant (Hualde 1989b, c).[3] This is in contrast with Broș' account that sees it as modification of place features.

In Chilean Spanish, deletion is the preferred repair mechanism to avoid coda /s/, as demonstrated by word-final coda /s/ deletion (1b), *tres* [tɾé]. In OT this can be captured through the domination of the constraint against the deletion of an entire segment, Max (seg), by the one prohibiting deletion of the suprasegmental node

[3] The analysis of aspiration as the deletion of the suprasegmental node is also supported by processes of total assimilation/gemination observed in some aspirating dialects (Coria, Extremadura), *obispo* [oβíhppo] 'bishop', *costal* 'sack' [kohttál], mosca [móhkka] 'fly', in which the placeless [h] assimilates to the point of articulation of the following consonant (Hualde 1989b, c).

Max (SL). The domination of the constraint against coda /s/ over the two Max constraints indicates that these two are possible repair mechanisms. The evidence for the ranking of *s]coda over Max (SL) will be presented below (see 9).[4]

(5) *s]coda >> Max (SL) >> Max (seg)

The relevant constraints are in (6):

(6) s-aspiration and deletion constraints
*s]coda: no coda [s].
Max (SL): No deletion of the supralaryngeal node (i.e., point-of-articulation features).
Max (seg): No segment deletion.

Onset: Syllables must have onsets
*s| PrWd: no [s] to the left of a PrWd boundary (Wiltshire 2006)
Contiguity: No segment deletion word-internally.
Align L (Stem, s): Align the left edge of the stem and a syllable boundary

(7) Aspiration in word final position
/mes/ 'month'

	*s]coda	Max (SL)	Max (Seg)
a.☞ mé			*
b. més	*!		
c. méh		*!	

The tableau in (7) shows the selection of the candidate with deletion (7a) over competitors with aspiration and coda [s] because it satisfies the two highest ranked constraints (against coda [s] and aspiration), which are violated by candidates (7b) and (7c).

Final [s] in the singular becomes word-internal when the plural suffix /es/ is added (8). Word internal [s] is now realized faithfully because it is no longer in the coda and it satisfies all constraints. In addition, word-final plural [s] is evaluated as in the example in (7), demonstrating that deletion is preferred over aspiration or retention, because Max (Seg) is the only constraint violated by (8a), the winner, while (8b) and (8c) incur violations of higher ranked constraints, *s]coda and Max (SL), against retention and aspiration respectively.

[4] Broš (2018) uses an Identity constraint instead, Ident (Pl), and argues against Max (Pl) because the latter assumes that features are autosegments. Notice that this is not an issue for the constraint Max (SL), which refers to the supralaryngeal node. As mentioned above, we view aspiration as the deletion of the supralaryngeal node, in contrast with the deletion the entire segment, banned by Max (Seg).

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(8) Retention in the onset and aspiration in word-final position
/meses/ 'months'

	*s]coda	Max (SL)	Max (Seg)
a.☞ mé.se			*
b. mé.ses	*!		
c. mé.seh		*!	

Aspiration surfaces instead of deletion in two contexts: i. word internally; ii. across words, prevocalically. As is usually the case in OT, the preference for aspiration now reflects domination by other constraints, which would be violated by a candidate with deletion.

Word internally, aspiration avoids deleting a segment within a word (rather than at the edges). The constraint banning deletion word internally, Contiguity (6), dominates faithfulness constraints, resulting in the ranking: Contiguity, *s]coda >> Max (SL) >> Max (seg), *este* [ehte]. *s]coda dominates Max (SL) because aspiration is preferred over s-retention.

(9) Aspiration in word-internal position
/este/ 'this'

	Contiguity	*s]coda	Max (SL)	Max (Seg)
a. [éte]	*!			*
b. [éste]		*!		
c.☞ [éhte]			*	

As seen in (9), candidate (a) is ruled out by a violation of the highest ranked constraint, Contiguity because it deletes a segment word internally; (c) beats (b) because it does not incur a violation of *s]coda, only of Max (SL) which is ranked lower. I leave the definition of Contiguity purposefully vague for now, simply as 'within the word'. It will be become clear in 3.2. that the word referred to must be the prosodic word, rather than the morphological word which would have suited the purposes of the analysis to this point.

Before moving on to phrasal contexts, a few comments about the underlying representation are in order. The input forms in (7-9) suggest that /s/ is the underlying representation. This is a reasonable assumption given alternations such as *mes* [me] 'month; *meses* [mé.se] 'months'; *mes azul* [mé.ha.úl] 'blue month'; and *mes blanco* [me.βláŋ.ko] 'white month'. Nonetheless, in OT, and under the Richness of the Base (Prince & Smolensky 1993; McCarthy 2002), the underlying representation need not be specified, as the constraints and constraint ranking should be able to select the optimal candidate, regardless of the form of the underlying representation. In fact, it can be shown that this is the case once we include the markedness violation incurred by [h], i.e., *h, ranked under *s]coda, but higher than Max (Seg), so that deletion is still preferred over aspiration and aspiration is better than coda [s].

The tableaux (7'-9') have input /h/. They are marked with an apostrophe (') to refer to the corresponding tableaux with input /s/.

(7') Aspiration in word-final position
/meh/ 'month'

	*s]coda	* h	Dep (SL)	Max (SL)	Max (Seg)
a.☞ mé					*
b. més	*!		*!		
c. méh		*!			

(8') Retention in the onset and aspiration in word-final position
/meheh/ 'months'

	*s]coda	*h	Dep (SL)	Max (SL)	Max (Seg)
a.☞ mé.se			*		*
b. mé.ses	*!		**		
c. mé.seh		*!	*		
d. mé.he		*!			*
e. mé.hes	*!		*		
f. mé.heh		**!			

(9') Aspiration in word-internal position
/ehte/ 'this'

	Contiguity	*s]coda	*h	Dep (SL)	Max (SL)	Max (Seg)
a. [é.te]	*!					*
b. [és.te]		*!		*		
c.☞ [éh.te]			*			

As mentioned above, the result of evaluation with /h/ in the input (7'-9') is the same as evaluation with input /s/ (7-9); in other words, [me] [me.se] and [eh.te] are the winners. In addition to the presence of a new constraint *h, it must be noted that all candidates in which output [s] corresponds to input /h/ incur a faithfulness violation against insertion of the supralaryngeal node, i.e., Dep (SL). Dep (SL) appears in (7'-9') for purposes of demonstration only and will not be included in other tableaux from now on. Also notice that (8') has two /h/'s in the input: the first one is word medial and the second is word final. (8a-c) are the candidates in which word-medial /h/ corresponds to output [s] and (8d-f) have a faithful output [h]. Although the ranking of *h with regard to Dep (SL) was undetermined to this point, it becomes clear not that *h must dominate Dep (SL), as [mé.se] is better than [me.he].

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Another context in which aspiration is preferred to deletion is in prevocalic position across word boundaries. Here aspiration takes place in part to avoid an onsetless syllable, which would be the case if deletion were to apply. [h] serves as an onset at the expense of violating the constraint that requires alignment of the stem and the syllable, Align-L (Stem, s) (6). The relevant ranking is: Onset, *s]coda >> Max (SL) >> Max (seg) >> Align-L (Stem, s). Candidate evaluation is in (10) (see (12) where no onset violation is at stake).

(10) Aspiration across words, in prevocalic position: selection of the wrong candidate
tre/s/ *amigas* 'three friends' (fem.)

	Onset	*s]coda	Max (SL)	Max (Seg)	Align L (Stem, σ)
a. tɾe.|a.mí.ɣa	*!			*	
b. ✖tɾe.s|a. mí.ɣa					*
c. tɾe.h|a.mí.ɣa			*!		*
d. tɾeh.|a.mí.ɣa	*!		*		

The ranking and constraints in (10), however, incorrectly selects the faithful candidate (10b) (marked with ✖) as the winner: [s] is preferred to [h] in (10b) because, in addition to satisfying Onset, [s] is faithful to the input, satisfying Max (SL), unlike (10c). Yet, aspiration overapplies and [h] surfaces in the actual candidate [tɾe.ha.miga] (10c). This failure to select the correct candidate is used by Broš (2018) as argument for Stratal OT account. Overapplication is explained by a Stratal OT account (Broš 2018) through constraint reranking at the phrasal level (we will return to this later). Yet, I show that neither strata or reranking are necessary. [h] responds to the need to be weak (to aspirate or to delete), in Wiltshire's terms (2006), next to a prosodic boundary, such as the prosodic word (PrWd). Although [h] is no longer in the coda in across-the-word prevocalic position, it is adjacent to a PrWd boundary (|), [tɾe.h|a.miga] (11). Overapplication is such only when it is considered in relation to the coda position (not in regard to the PrWd). Ranking of *s /PrWd above faithfulness constraints guarantees the selection of the correct output in (11). A candidate with deletion (11a) fails on account of a violation of Onset; (b) incurs a *s /PrWd violation; (c) satisfies all high-ranked constraints and is better than (d) which has no onset.

(11) Aspiration across words, in prevocalic position
tre/s/ *amigas* 'three friends' (fem.)

	Onset	*s]coda	*s /PrWd	Max (SL)	Max (Seg)	Align L(Stem, s)
a. tɾe.|a.mí.ɣa	*!				*	
b. tɾe. s|a. mí.ɣa			*!			*
c.☞ tɾe.h|a.mí.ɣa				*		*
d. tɾeh. |a. mí.ɣa	*!			*		

It should be noted that a potential candidate with stem-final /s/ [me**s**-e] (not shown in 8) fails to aspirate due to the absence of a PrWd boundary.

Since onset satisfaction is the reason for aspiration in across-the-word prevocalic position, the analysis predicts that, if an onset is available, coda /s/ repair will take place via the preferred repair strategy (that involving the lowest ranked constraint), i.e., deletion. As seen in (2a) (repeated here as 12a for convenience), this is precisely the correct outcome when word final /s/ is followed by a consonant-initial word.

(12a) Deletion across the word, in preconsonantal position

tres meses	[tɾé.mé.se]	'three months'
las normativas	[la.noɾ.ma.tí.βa]	'the rules'
tres términos	[tɾe.téɾ.mi.no]	'three aspects'

(13) Deletion across the word, in preconsonantal position
tɾe/s/ mése/s/ 'three months'

	Onset	*s/coda	*s /PrWd	Max (SL)	Max (Seg)	Align L (Stem, σ)
a.☞ tɾe.| mé.se					*	
b. tɾes.| mé.se		*!	*			
c. tɾeh.| mé.se				*		

As seen in the tableau in (13), (b) violates both highly ranked constraints that ban [s] from the coda and from being adjacent to a prosodic word. The candidate with deletion (a) is better than the one with aspiration (c), because, all things being equal, deletion is preferred to aspiration (c violates the more highly ranked Max (SL)).

3.2. Prefixed forms

Prefixes can be argued to introduce a morphological boundary between the prefix and the stem. In that case, the morphological boundary will exempt them from a Contiguity violation, and deletion should apply to /s/ final prefixes, such as *des-*, when followed by a consonant-initial word as seen in candidate (a) [de.kal.sar] in (14). However, this is not the correct form for Chilean Spanish, which shows aspiration when the prefix is followed by a consonant-initial stem, [deh.kal.sar] (see the data in (3). In sum, the constraints and constraint rankings proposed so far and seen in (14) select the wrong candidate (marked with ✖).

(14) Selection of incorrect candidate in a consonant-initial prefixed base (Correct output [deh.kal.sar])
/deh + kalsar/ 'to take off someone's shoes'

	Onset	Contiguity	*s/coda	*s /PrWd	Max (SL)	Max (Seg)
a. ✖de.kal.sar						*
b. des.kal.sar			*!			
c. deh.kal.sar					*!	

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I propose that it is not a morphological boundary that is at stake, but a prosodic word boundary. To account for prefix-final /s/ in Chilean and other dialects, prosodic word boundaries become relevant. Prefixes exhibit dialectal variation in how they relate to the prosodic word. I argue that in Chilean, like in Caribbean II (Rio Negro Argentinian, Colina 2002), there is no intermediate prosodic word boundary between the prefix and the stem, while in dialects like Granada and Caribbean I, prefixes constitute a semi-prosodic word that is attached to the prosodic word but do not constitute their own prosodic word, as represented in (15).

(15) a. Chilean [deh.kal.sar] [de.sa.ser]Pw
b. Other dialects [deh.[kal.sar] Pw] [deh[a.ser]Pw]Pw

The structure in (b) for prefixes finds justification in that prefixes have a certain degree of independence but are not prosodic words, as they cannot bear stress. This degree of independence is also supported by Wiltshire (2006) and Broș (2018, 2019), among others. However, authors like Broș (2018) propose a uniform prosodic structure for prefixes across dialects, and resort to other mechanisms to account for their behavior with respect to aspiration in Chilean. I contend that the ambiguous behavior of prefixes, which exhibits some of the characteristics of prosodic words, is the driver of the variation, and that the hybrid nature of prefixes is interpreted as two possible prosodic structures, one with a prosodic word boundary and another without it. Thus, in Chilean Spanish, which has the structure without the prosodic word boundary in (15a), *descalzar* behaves like *este* (1a).

(16) Candidate selection in a consonant-initial prefixed base (Correct output [deh.kal.sar])
/deh + kalsar/ 'to take off someone's shoes'

	Onset	Contiguity	*s/coda	*s /PrWd	Max (SL)	Max (Seg)
a. [de.kal.sar]		*				*
b. [des.kal.sar]			*!			
c.☞ [deh.kal.sar]					*!	

In (16) (a) the candidate with deletion is eliminated on the basis of a Contiguity violation; (b) incurs a violation of *s/coda, since it has no aspiration and no deletion. (c) is the winner as it only violates Max (SL). *s /PrWd is vacuously satisfied because there is no prosodic word boundary.

The prosodic word structure (only one prosodic word, no internal prosodic word) presented in (15a) also produces the correct forms for the prefixed forms that attach to a vowel-initial word, as shown in (17):

(17) Candidate selection in a vowel-initial prefixed base
/des+ aser/ 'to undo'

	Onset	Contiguity	*s/coda	*s /PrWd	Max (SL)	Max (Seg)
a. [de.a.ser]	*!	*				*
b. [de.ha.ser]					*!	
c. [des.a.ser]	*!		*			
d.☞ [de.sa.ser]						

In (17) deletion (a) incurs violations of Onset and Contiguity. The candidate with aspiration, (17b), only violates Max (SL), but the winner (d) has no violations at all. (c), with [s] but lack of resyllabification, loses on account of Onset and *s/coda.

Evaluation in other dialects that have a prosodic word boundary between the prefix and the base, such as Caribbean I (and Granada Spanish variety mentioned by Broš) is shown in (18). Since these varieties do not have contextually determined deletion, then the ranking of the faithfulness constraints must be the opposite of Chilean, i.e., Max(Seg) >> Max (SL).

(18) Candidate selection in a consonant-initial prefixed base in Granada Spanish
/des + kalsar/ 'to take off someone's shoes'

	Onset	Contiguity	*s/coda	*s /PrWd	Max (Seg)	Max (SL)
a. [de.| [kal.sar]]					*!	
b. [des.| [kal.sar]]			*!	*		
c.☞ [deh.| [kal.sar]]						*

(19) Candidate selection in a vowel-initial prefixed base in Granada Spanish
/des + aser/ 'to undo'

	Onset	Contiguity	*s/coda	*s /PrWd	Max (Seg)	Max (SL)
a. [de.| [a.ser]]	*!				*	
b.☞ [de.h| [a.ser]]						*
c. [des.| [a.ser]]	*!		*	*		
d. [de.s| [a.ser]]				*!		

In (19) candidate (a) incurs a violation of top-ranked Onset and of Max(Seg), on account of deletion of /s/. (c) also violates Onset as well as *s]coda and

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*s /PrWd because it has [s] in the coda and next to a prosodic word boundary. (b) is better than (d) because (d) has [s] next to a prosodic word boundary violating *s /PrWd. (b) only incurs a violation of Max (SL), due to aspiration.

Before concluding the analysis, further detail is necessary in connection with the formal optimality-theoretic mechanism that creates the two types of prosodic words presented in (15). Two constraints become relevant:

(20) Align-L (Lex, PwD): Align the left edge of every lexical word with the left edge of the prosodic word (Selkirk 1996; Wiltshire 2006)

NonRecursivity: no Ci dominates Cj when i = j

Align-L (Lex, PwD) guarantees that every lexical word is aligned with the left edge of some prosodic word, so that the left edge of all lexical words coincides with the left edge of a prosodic word. *hacer* [aser] is a lexical word, but *des* is not, so it cannot be its own prosodic word. However, *des* must be incorporated into prosodic structure and the lexical word must be aligned with a prosodic work. One way to do this is for *des* to attach directly to the prosodic word and have [aser] project a prosodic word boundary to the left (see 25a). This, however, violates nonrecursivity which requires that each unit dominate a unit on the immediately lower category, and each lower category be contained in one category on the immediately higher category (Wiltshire 2006). In Granada Spanish and Caribbean I the prosodic word dominates itself, thus violating NonRecursivity (21).

(21) Align-L (Lex, Pw) >> NonRecursivity

Other dialects, among them Chilean Spanish, prefer to fail to align a lexical word with a prosodic word, rather than violating NonRecursivity, which points to the ranking in (22),

(22) NonRecursivity >> Align-L (Lex, Pw)

These dialects (Chilean, Caribbean II, Rio Negro Argentinian, Cuban, Kaisse 1998) have no prosodic word boundary between the lexical base and the prefix (see 25b). They are integrated into the prosodic word formed by the base. In sum, as it is usually the case in OT, dialectal variation in regard to the parsing of the prefix and the lexical base is the result of constraint reranking as illustrated below for *deshacer*.

(23) A prosodic word boundary between a prefix and its base

	Align-L(Lex, Pw)	NonRecursivity
a.☞ de.s|a.ser		*
d. de.sa.ser	*!	

In (23), when Align-L(Lex, Pw) dominates NonRecursivity the candidate with a prosodic word boundary between the prefix and the base is the winner because it satisfies the more highly ranked constraint Align-L(Lex, Pw) at the expense of creating a recursive structure.

(24) No prosodic word boundary between a prefix and its base.

	NonRecursivity	Align-L (Lex, Pw)
a. de.s|a.ser	*!	
d.☞ de.sa.ser		*

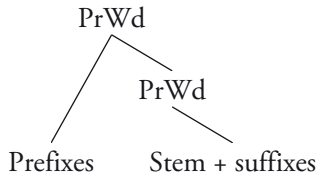
In (24), when NonRecursivity dominates Align-L(Lex, Pw), the candidate without a prosodic word boundary between the prefix and the base is the winner because it satisfies the more highly ranked constraint NonRecursivity at the expense of a lexical word *hacer* [aser] which is not aligned with a prosodic word. This is the case in Chilean.

Once a prosodic word boundary is introduced, the constraint *s /PrWd becomes relevant, while it remains trivially satisfied in dialects that have no prosodic word boundary between the base and the prefix in order to avoid non-recursivity.

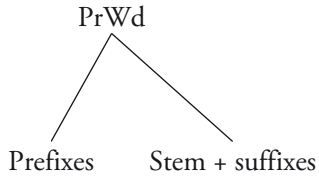
As mentioned above, the absence of a prosodic word boundary explains both [deh.kal.sar], and [de.sa.ser] in Chilean. Since there is no prosodic word boundary, aspiration and deletion work like in [me.se], with only one prosodic word, where base-final [s] is not aspirated or deleted and it is syllabified as the onset of the second syllable.[5]

(25) Prosodic structure of prefixes

a) Granada and Caribbean I



b) Chilean and Caribbean II



[5] One must note that unlike prefixes, phrasal contexts do not exhibit variation of the type seen in Chilean vs. Granada Spanish. Yet, some independent morphemes, such as articles, do not constitute prosodic words themselves. I propose, following Selkirk (1996) and Broš (2019), that articles (like clitics) are attached directly to the phonological phrase and that the lexical words they precede always project a prosodic word boundary. This also in agreement with Peperkamp's proposal for Standard Italian (1996: 120). In an OT analysis, this structure would violate exhaustivity, which requires that all structure dominate a lower category, i.e., a phonological phrase that does not dominate a category lower than the prosodic word.

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4. Comparison with Stratal OT accounts (Broș 2018, 2019)

The comparison in this section focuses on the analysis proposed in section 3 and on Broș (2018). I refer the reader to Broș (2019) for a careful presentation of a Harmonic Serialism account (Torres-Tamarit 2014) and alternative output-to-output accounts (Kenstowicz 1996; Colina 1997, 2002; Face 2002). Leaving aside derivational accounts (see Colina 2002, 2009 for critique), most alternative analyses include some type of lexical-postlexical level distinction, and thus a certain degree of serialism, even when not framed in a Stratal OT model, including Colina (2002), Face (2002), and Peperkamp (1997: 163-167). This section centers on a Stratal OT proposal, as the most developed 'serial' model within OT.[6]

The analysis proposed in section 3 of this paper can be summarized as follows: deletion is preferred over aspiration, unless /s/ occurs word-internally, as in [me], [me.se] [ehte]; or across words, before a vowel-initial word, [tɾe.h|a.mí.ɣa]. In this case, aspiration is preferred to deletion to create an onset; it is better than [s] because a weak form is required before the left edge of a prosodic word. Before a consonant, deletion surfaces as expected, [tɾé.mé.se].

The requirement that the left edge of a prosodic word be aligned with/preceded by a weak form and the presence or absence of a PrWd boundary depending on the dialect explains prefixes and their dialectal variation. In Chilean there is no prosodic word boundary between a prefix and its base (prefixes behave like one word); as result, prefix-final aspiration only surfaces before a consonant. Dialects with prefix-final aspiration in all contexts have a prosodic word boundary between a prefix and its base.

In Broș' analysis (2018), however, aspiration is favored at the lexical level [ehteh]. At the postlexical level, the ranking changes with a preference for deletion as in [ehte], [me], [me.se]; [h] is retained before a vowel-initial word to create an onset [tɾe.ha.mí.ɣa] [u.na.βé.hen.tɾé]; and deletion before a consonant-initial word [tɾé.mé.se] is explained through the markedness constraint on [h], as [h] before a consonant should be otherwise retained from the lexical level.

The key to Broș' explanation of prefixes in Chilean is that they must be treated as a whole, resistant to insertion or deletion. Dialects with prefix-final aspiration in all contexts (e.g., Granada in her study) must resort to a stratal solution: resyllabification applies only postlexically, not at the word level. In other words, the align constraint responsible for resyllabification is high in the hierarchy at the word level but it is demoted at the phrasal level.

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[6] Recent acoustic studies (Torreira & Ernestus 2011; Hualde & Prieto 2014; Strycharczuk & Kohlberger 2016) find that canonical and derived onsets are not acoustically identical, suggesting incomplete resyllabification. In the present account, acoustic differences can be explained because a derived onset is a subsyllabic constituent that belongs to a morphological word different from the rest of the subsyllabic constituents in the syllable (unlike a canonical onset, which is a subsyllabic constituent that belongs to the same morphological word as the rest of the subsyllabic constituents). In other words, acoustic differences are a consequence of morphological and prosodic misalignment. Bradley (2020) in an OT analysis based on articulatory phonology/gestures attributes the differences to bidirectional coupling in derived onsets, vs strict in-phase coupling (with the following vowel) in canonical onsets.

A more detailed presentation of and comparison with Broš' analysis (2018) follows. In (26) (a), the candidate with aspiration word-internally and deletion in word final position is the winner as it only incurs violations of IDENT(PL) and MAX (Seg). Any type of word-internal deletion is prevented through CONTIG and [s] retention by *s]CODA. The ranking of IDENT(PL) over MAX (Seg) results in deletion in word final position. This analysis does not differ significantly from the one presented in section 3, with the exception of the name and slightly different formulation of IDENT(PL) (that functions like MAX (SL)).

(26) Aspiration and deletion in /escondidos/ (Broš 2018)
/escondidos/

	*s]CODA	CONTIG	IDENT(PL)	MAX(Seg)
a.☞ eh.kon.dí.ðo			*	*
b. e.kon.dí.ðo		*!		**
c. eh.kon.dí.ðoh			**!	
d. es.kon.dí.ðos	**!			

(27) Word-level (i.e., lexical level) aspiration (Broš 2018)
/bes/

	*s]CODA	MAX(Seg)	IDENT(PL)
a.☞ béh			*
b. bés	*!		
c. bé		*!	

(27) shows evaluation at the word level in which the ranking of IDENT(PL) and MAX(Seg) is different from the one at the phrase level (seen in 26 and 28). Domination of MAX(Seg) over IDENT(PL) results in the preference of aspiration over deletion at the word level. The winning candidate (a) [beh] will then enter the next level with aspiration, as in (27).

(28) Phrase-level aspiration (prevocalically)
/u.na + beh + en.tɾe/

	ONSET	*s]CODA	IDENT(PL)	MAX(Seg)
a.☞ (u.na).(βé).(hen.tɾé)	*			
b. (u.na).(βé).(sen.tɾé)	*		*!	
c. (u.na).(βé).(en.tɾé)	**!			*

As noted by Broš (2018), the reranking of the faithfulness constraints at the phrase level (28) will not account for deletion before a consonant-initial word, so she

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introduces the constraint against [h], *h, which is ranked above Max(Seg) to select the candidate with deletion.

(29) Phrase-level deletion (preconsonantally)
/u.na + beh + ko.mi/

	Onset	*s]Coda	Ident(Pl)	*h	MAX(Seg)
a.☞ (u.na).(βé).(ko.mí)	*				*
b. (u.na).(βéh).(ko.mí)	*			*!	

To summarize the analysis up to this point, Broš (2018) includes two levels of evaluation and a constraint *h to account for words in isolation and phrases.

In regard to prefixed forms, Broš proposes that they behave like whole words, with no internal prosodic structure that would allow for deletion without violations of Contiguity. She clarifies her definition of Contiguity, which, like this analysis, must refer to the prosodic word (not the morphological word). At the word level, for prefixed forms with vowel-initial bases, all candidates without resyllabification (30c, d, e) are ruled out by Onset, while those with [h] (30d) violate the faithfulness constrain Ident(Pl). (30a) and (30b) tie on account of misalignments of the syllable and the stem due to resyllabification, but (a) is preferred over (b) because it has no further constraint violations.

(30) Word-level evaluation of *deshecho*
/des + etʃo/

	Onset	Contig	*s]Coda	Align-L	MAX (Seg)	Ident (Pl)	*h
a.☞ (de.(sé.tʃo))				*			
b. (de.(hé.tʃo))				*		*!	*
c. (des.(é.tʃo))	*!		*				
d. (deh.(é.tʃo))	*!					*	*
e. (de.(é.tʃo))	*!	*			*		

(31) Phrase-level evaluation of *descalzar*
/deh + kal.saɾ/

	Onset	SSG	Contig	*s]Coda	Align-L	Ident (Pl)	*h	Max (Seg)
a.☞ (deh.(kal.sáɾ))							*	
b. (de.(hkal.sáɾ))		*!			*		*	
c. (des.(kal.sáɾ))				*!		*		
d. (de.(skal.sáɾ))		*!			*	*		
e. (de.(kal.sáɾ))			*!					*

In (31), for prefixed forms with consonant-initial bases, a candidate with deletion would violate contiguity of the prosodic word (31e), but one with [s] would fail on account of an [s] in the coda (31c). Syllabifying the [s] or [h] in the onset would incur a sonority violation that does not rise towards the nucleus (SSQ) (31b, 31d). [h] is preferred to having a coda [s] and thus (31a) is the winner. Notice that in (31) (deh.(kal.sár)) leaves the word level with an aspirated coda, which becomes the input to the postlexical/phrasal level in (31).

To explain dialects like Granada Spanish (and Caribbean I) that present aspiration across a vowel initial prefix boundary, Broș argues again for the need for a word-level and a phrasal-level ranking under Stratal OT, rather than variation in prosodic structure. Resyllabification does not take place at the word level, only at the phrase level, which is accounted for through the ranking of Align-L above Onset at the word level (32), but below it at the phrase level (33).

(32) Word-level evaluation across a prefix boundary, with no resyllabification /des + etʃo/

	Align-L	Onset	Contig	*s]Coda	MAX (Seg)	Ident (Pl)	*h
a.☞ (deh.(é.tʃo))		*				*	*
b. (de.(hé.tʃo))	*!					*	*
c. (des.(é.tʃo))		*		*!			
d. (de.(sé.tʃo))	*!						
e. (de.(é.tʃo))		*			*!		

(33) Phrase-level evaluation across a prefix boundary, with resyllabification /deh.+ e.tʃo/

	Onset	Contig	*s]Coda	Align-L	Max (Seg)	Ident (Pl)	*h
a.☞ (de.(hé.tʃo))				*			*
b. (de.(sé.tʃo))				*		*!	
c. (des.(é.tʃo))	*!		*			*	
d. (deh.(é.tʃo))	*!						*
e. (de.(é.tʃo))	*!				*		

In other words, Broș proposes differences in syllabification at the word level and at the phrase level in prefixes in Granada Spanish (but not for Chilean Spanish). As she says, her analysis includes "a remnant of pre-OT rule ordering" to ensure that aspiration applies at the word level and resyllabification afterwards, at the phrase level (Broș 2018: 59). Those familiar with the derivational analysis proposed by Hualde

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(1989a,b, 1991), summarized by others later (Colina 2002, 2009) and by Broș herself, will notice the similarities, despite differences in formalism, in particular the failure of the final consonant to resyllabify before aspiration has had a chance to apply (see 31a and 32a). In contrast, in the analysis proposed, as well as in Colina (2002), dialectal differences are attributed to differences in prosodification, in particular in the prosodic structure of prefixes. Variation in the prosodification of prefixes is not entirely surprising given the hybrid nature of prefixes, which have some features of independent words, and exhibit variable behavior across languages. Despite not being able to carry stress, in some languages like German and Dutch, prefixes can constitute separate words; and they are historically related to independent words (some Spanish prefixes were prepositions in Latin, e.g., *in*, *dis*, *inter*). Also, as part of the derivational morphology, prefixes exhibit similar behavior to separate words (like the members of a compound). Some languages have two types of prefixes: one that forms a prosodic word with the stem; another that constitutes an independent word (Nespor & Vogel 1986; Peperkamp 1994; Nespor 1999). For instance, vowel-final prefixes are independent prosodic words in Italian, unlike consonant-final ones. Similar behavior is observed, as noted, across dialects of Spanish, among which Caribbean I and Granada have prefixes that behave like independent words by attaching directly to the prosodic word (25a), while in Chilean and Caribbean II, they are integrated into the prosodic word formed by the base (25b), as seen in the representations in (25).

Broș, in arguing for a stratal account, acknowledges the possibility of variation in prosodic structure, but prefers an analysis that maintains uniform prosodic representation across dialects (2018: 71), making the "assumption that prosodic structure is the same for all Spanish dialects" (2018: 50). Instead, her analysis resorts to strata and variation in the syllabification of prefixes. As discussed above, there exists independent evidence that supports cross-linguistic variation in prosodic structure of prefixes and of clitics (cf. Italian dialects in Peperkamp 1996).

5. Summary and conclusions

This article has shown that standard OT can account for some opacity effects in Spanish, like those seen in the aspiration/deletion data in varieties like Chilean Spanish. Consequently, the aspiration phenomena in Chilean Spanish do not per se constitute evidence in support of Stratal OT, as argued by Broș. Furthermore, the analysis proposed has, arguably, advantages over existing Stratal OT accounts beyond the absence of strata and serialism. It is a simpler and more economical account, which relies on variation on prosodic structure formalized through the reranking of constraints. Variation in prosodic structure (especially affecting units that exhibit variable behavior, such as prefixes and clitics) is to be expected cross-dialectally, as it is also found also in syllabification and metrical structure. In fact, Broș' Stratal OT analysis itself must rely on a degree of variation in prosodification, as seen in the case of the resyllabification of prefixes in Granada Spanish.

While the data under examination do not require a Stratal account, this does not necessarily negate the need for strata in phonology. Various types of opacity, different in nature, may or may not lend themselves well to parallel alternatives: some phenomena, like aspiration, in which prosodic or morphological structure interact with

phonological processes and create various levels of structure/constituency are intrinsically different from others, like spirantization, that involve the lexical and postlexical phonological processes with minimal or no interaction with the morphology and that give rise to segments not present in the underlying inventory.

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