Pseudo-Geminates: An Autosegmental Approach to Consonant "Lengthening" in Chilean Spanish

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This Honours Thesis represents my own work and due acknowledgement is given whenever information is derived from other sources. No part of this Honours Thesis has been or is being concurrently submitted for any other qualification at any other university.

Signed:_____

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Abstract

Spanish lost the geminates and long vowels from Latin, and heavily constrains vowels in hiatus. Given this, the understudied Chilean dialect displays phonological processes that seemingly create prosodically ill-formed outputs, which have been neglected in the literature. Coda /ɾ/ and domain-final /s/ appear to trigger the compensatory lengthening (CL) of following onsets, while intervocalic voiced stops are able to delete and leave their surrounding vowels in hiatus. Since CL mostly affects vowels cross-linguistically, opting to lengthen a consonant over a vowel is unexpected, especially when Spanish lacks both of these length distinctions phonemically. This thesis looks to constrain existing autosegmental theories, proposing a distinction between geminates (a single segment linked to two prosodic positions) and pseudo-geminates (identified at the melodic tier).

We recorded seven pairs of adult native speakers in the Santiago area and found that the observed forms are used most often in colloquial speech registers. We controlled for morphological and phonological environment, as well as stress for each token, to look for relevant effects.

Coda /ɾ/ strictly lengthens sonorant consonants, and final /s/ lengthens any following onset. We adopt a feature-geometric structure with a [Spontaneous Voice] node, claiming /ɾ/ has no place features and a bare [SV]. Therefore, place and manner features from adjacent sonorants have a target for spreading, creating the illusion of gemination from what is instead proposed to be feature-filling—a phonotactic repair that achieves featural symmetry in a coda-onset cluster. Features are lost in the lenition trajectory from /s/ to [h] to [Ø] in final position, where [Ø] still retains a [consonantal] feature in its root node, allowing it to be a target for assimilation from contoids. Finally, intervocalic voiced stops lenite but do not fully delete. The feature [cons] is also retained here and blocks feature-filling from vocoids, as with /s/, because surrounding vowels are kept from entering hiatus and gliding.

For typical CL, as in other languages, an entire moraic segment is deleted, thereby stranding its mora and allowing vowels to associate to it. By contrast, in Chilean, when few features are linked to a mora, whether due to underspecification (/ɾ/) or partial deletion (/s/), features from adjacent segments spread to those positions. This way, partial assimilation derives pseudo-geminates without disturbing any melody-prosody association, which would otherwise be altered by deletion and total assimilation. As long as some featural trace is left in the representation, moras are not stranded, and assimilation is constrained to feature-filling.

1 Introduction

Modern Spanish lost the contrast between short and long segments originally present in Latin. (see Loporcaro (2015) for an overview). For geminates specifically, Holt (1999) argues that obstruent geminates eroded first, and around the X or XI century, sonorant geminates also simplified. Finally, vowel length became a quality distinction, the mid vowels merged, and Spanish was left with an exclusively short-segment system. Given these facts, it is very surprising that Chilean Spanish (henceforth Chilean) appears to derive surface geminates, as shown in (1).

(1)

a.	/pjeɾna/	→	[pjénna]	'leg'
	/aɾ̄eglaɾ+me/	→	[aɾ̄eglámme]	'to fix myself up'
	/eɾmana/	→	[emmána]	'sister'
	/kaɾlos/	→	[kállos]	'Carlos'
	/ablaɾ+lo/	→	[avlállo]	'to talk about it'
b.	/menos+feo/	→	[ménofféo]	'less ugly'
	/es+nada/	→	[ennáda]	'it's nothing'
	/mas+lindo/	→	[mállíndo]	'prettier'
	/los+webos/	→	[lowwévoh]	'the eggs'
	/gɾandes+pweɾtas/	→	[gɾándeppwéɾtah]	'big doors'

Coda /ɾ/ variably triggers the gemination of following sonorant onsets (1a.), and domain-final[1] /s/ triggers the gemination of subsequent word onsets in the same syntactic[2] projection (1b.). Upon first glance, this looks like a case of compensatory lengthening (CL), in which a coda consonant deletes, and the empty moraic position left behind by this deletion is provided with features from the following onset (Hayes, 1989). This change can also be thought of as total assimilation. However, the conditions for CL in Chilean point toward a different analysis than gemination.

Firstly, the only environment that triggers coda /ɾ/ elision is before sonorant consonants. If the sonority profiles of rhotic-nasal and rhotic-lateral clusters were a violation of syllable contact that needed repair (Murray & Vennemann, 1983), coda deletion would be a plausible strategy. Except, no other offending clusters in Chilean are repaired by whole-segment deletion. Rather, different lenition strategies (e.g. spirantization or manner assimilation) increase the sonority of the coda, outputting an alternative surface representation that is more faithful to the input than a full deletion (2).

(2) /admiɾable/ → [aðmiɾávle], [anmiɾávle] 'admirable'

Further, the asymmetry of /ɾ/ being the only consonant to lengthen the onset in a cluster, and only doing so before sonorant consonants, gives insight into a more detailed representation than just a deletion rule followed by CL.

Secondly, domain-final /s/ is well attested to variably debuccalize to [h] or delete in Chilean (Rogers & Bolyanatz, 2022). Nonetheless, if we posit a parameter for CL in Chilean that assigns right-to-left spreading so that onset gemination is specified (Hayes,

[1]For this study, domain-final refers to the position before a morphological boundary which marks the edge of a domain for stress assignment (e.g. a clitic+host boundary, but not a verb-inflection boundary).

[2]We use – to denote an affix attachment (e.g. verb-inflection), + to denote a morphological boundary within the same XP (e.g. a clitic+host), and # for any word boundary (e.g. verb#object).

1989), lengthening of a following domain-initial vowel is also predicted, as a vowel melody would be immediately adjacent to the deleted /s/, rather than a consonant. Yet, vowel lengthening is not attested. Additionally, hiatus is highly constrained in Chilean, commonly resolved via glide formation (Oroz, 1966), which makes forms like (3) opaque since /s/ deletion would derive the right environment, but hiatus repair seems to underapply.

(3) /los+aɾboles/ → [lo.árvoleh], *[lo.áːrvoleh], *[lwárvoleh] 'the trees'

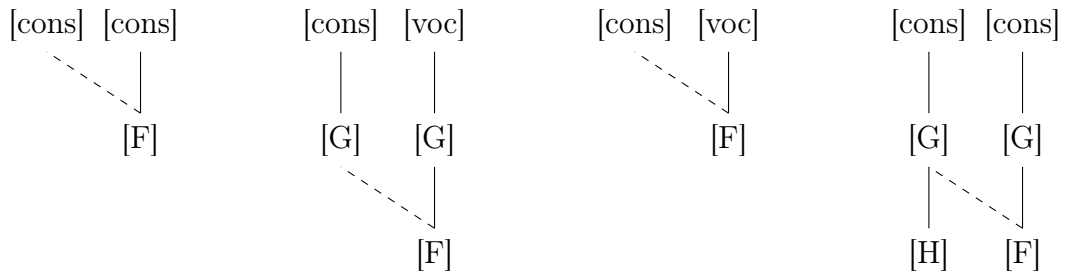
Lastly, intervocalic position is an obligatory context for voiced stop lenition (Harris, 1969; Mascaró, 1984; Carreira, 1998; Lozano, 1978), and this position also optionally leads to deletion. A voiced stop (/b, d, g/) can be lenited intervocalically either to [v, ð, ɣ] or [$\underset{\sim}{\text{v}}$, $\underset{\sim}{\text{ð}}$, $\underset{\sim}{\text{ɣ}}$],[3] or it can be deleted, and its surrounding vowels are also not affected by CL. Though a moraic approach predicts that onset deletion will never trigger CL, the resulting hiatus is still left unresolved.

(4) /moɾado/ → [moɾá.o], *[moɾáw] 'purple'

With the unusually restricted cases of /ɾ/-derived gemination, the failure to lengthen vowels following final /s/ deletion, and the underapplication of hiatus resolution following an intervocalic deletion, a CL analysis where onset consonants become geminates faces challenges in capturing our data. Aside from this, long vowels are disproportionately more likely to be the outcome of CL cross-linguistically (Kavitskaya, 2014), so exclusively creating geminates is marked. Moreover, De Chene and Anderson (1979) claim that languages without a phonemic length distinction are not able to derive corresponding long segments, so suggesting that CL is effective in Chilean would require much justification.

Instead, this paper proposes a feature-geometric analysis (Clements, 1985) where segments can *partially delete* by having most of their features delinked, while retaining a stable root node that holds the major class features [vocalic] and [consonantal]. For example, when an intervocalic voiced stop "deletes" as the final stage of lenition, we represent this as the loss of all features dominated by the [cons] root node of the segment. Feature-filling—a phonotactic repair—would normally provide the bare [cons] node with features from an adjacent melody (5a.) so the deficient segment has enough phonological information to surface. However, for this repair to occur, the target node must be a subset of the same node (and its dependents) in the providing structure. That is, a feature must fill a position in the target melody whose corresponding position in the source melody immediately c-commands that feature; higher nodes are not consulted (5b.).

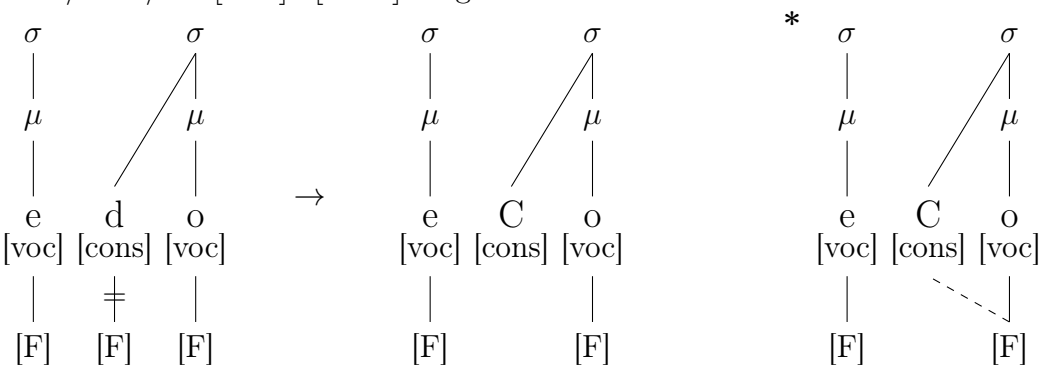
(5) a. b. *c. *d.



[3]Spirantization in many dialects turns voiced stops /b, d, g/ into homorganic fricatives [β, ð, ɣ], but in Chilean, the labial is almost exclusively spirantized to [v].

Feature-filling is blocked when a contoid like /s/ or a voiced stop is partially deleted intervocalically because no feature immediately dominated by [voc] may be shared with [cons] via feature-filling (5c.), given that a bare [cons] root is not a subset of vocoids. Moreover, the target position must not be occupied by another feature (5d.) since feature-filling refers to assimilation with no delinking. When feature-filling to [cons] is blocked, /C/ (an impoverished contoid melody only specified with [cons]) does not receive any features, and it is outputted with no phonetic content. The retention of a prosodic slot keeps the surrounding vowels from forming a true hiatus, thus not requiring resolution.

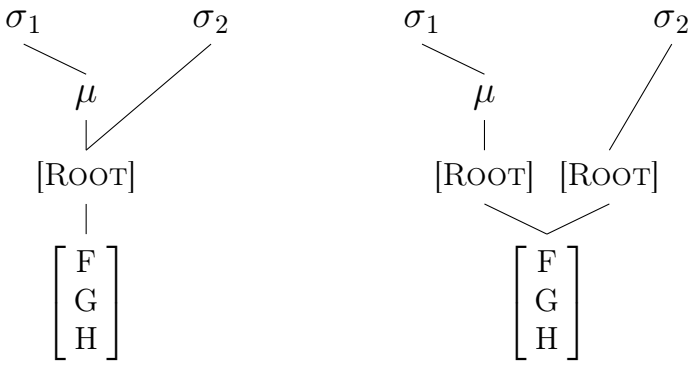
(6) /dedo/ → [dé.o] *[déwo] 'finger'



With this framework, Chilean "gemination" does not correspond to total (root node) assimilation, which would mean that all features of the target segment are deleted and the empty position fully assimilates to the following onset, forming a geminate. Instead, we argue that partial deletion removes all features except the root, and features from a neighbour spread to fill the underspecified melody whenever possible (i.e. /s/ before a contoid), unless blocked (i.e. intervocalic /b, d, g/). For /ɾ/, we will argue that rhotics behave asymmetrically because they are underspecified for many features, making them a target for assimilation. Rather than gemination, we call this *pseudo-gemination*.

We define a geminate (7a.) as a consonantal feature matrix that is associated to a mora, making it the closing segment of one syllable, and the onset of a following syllable (Davis, 1999). A pseudo-geminate (7b.) is a sequence of two consonantal feature matrices that share most features. Any unshared feature that is retained by one melody has a corresponding feature in the other melody, giving both segments the same representation individually.

(7) a. Geminate b. Pseudo-Geminate



A geminate comprises a single root node linked to both a mora in the rhyme of σ_1 and to the onset of σ_2. In contrast, a pseudo-geminate contains two identical root nodes, one in the coda of σ_1, and one in the onset of σ_2, both sharing every other feature specification beneath them. Because both roots are [cons] and all other features are either shared or identical, both halves of a pseudo-geminate[4] have corresponding specifications, making the pseudo-geminate phonetically indistinguishable from a true geminate.

The patterns observed in Chilean, where geminates appear to be generated under specific conditions, are best understood as pseudo-gemination rather than gemination. This analysis provides a more suitable explanation for the processes involved, as it accounts for the partial deletion of consonants and integrates Feature Geometry (Clements, 1985) with Moraic Theory (Hayes, 1989). The proposed autosegmental approach offers a more accurate representation of the data by preserving the mapping from the segmental tier to the prosodic frame, focusing on assimilation and feature sharing internal to the melody. Distinguishing between geminates and pseudo-geminates contributes to the broader understanding of segmental processes in languages without a phonemic length distinction, challenging traditional interpretations of gemination in CL frameworks.

2 Theoretical Assumptions

2.1 Compensatory Lengthening

According to Kavitskaya (2014), CL is "a set of phonological phenomena wherein the disappearance of one element of a representation is accompanied by a lengthening of another element." Since the lengthening is conditioned by some deletion, the process is said to be compensatory. It is common for a CVC syllable to lose its final C and lengthen its V, resulting in a CVV shape. Though this changes the syllable structure from having a nucleus and coda to having a branching nucleus, weight and syllable count are preserved. In cases where the second V of a CVCV string deletes, the first V lengthens, resulting in a CVVC shape. This second case is the so-called *double flop* which is explored in Hayes (1989). Crucially, a long vowel follows from the loss of a tautosyllabic coda consonant or a heterosyllabic vowel. See the descriptions in (8) from Kavitskaya (2014).

(8) a. $C_1VC_2 \rightarrow C_1V\text{ː}$
closed σ, short V → open σ, long V
1σ → 1σ

b. $C_1V_1C_2V_2 \rightarrow C_1V\text{ː}_1C_2$
open σ, short V → closed σ, long V
2σ → 1σ

We denote the segment whose features are deleted as the *target* segment, and the neighbouring segment that provides features to the empty position left by the deleted target shall be the *providing* segment. We label (8a.) CL_{CVC} (CL through consonant loss), and (8b.) CL_{CVCV} (CL through vowel loss). Importantly, the segment that deletes can be a consonant or a vowel, but the segment that lengthens is (almost) always a vowel. That is, CL corresponds to the "absorption by a vowel of the time of a lost following

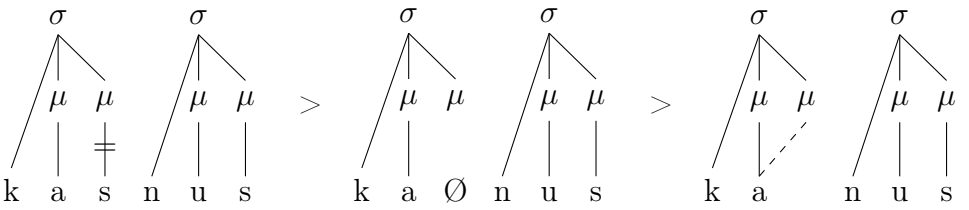
[4]The term partial geminate is sometimes used in the literature, but we use pseudo-geminate to clarify that both segments in the partially converging pair have the same featural specifications individually.

consonant" (Whitney, 1889, p. 84). However, there are two other kinds of CL processes discussed by Morin (1992), both of which lengthen a consonant instead of a vowel. This thesis will argue that these secondary types are not gemination because no segment is deleted, and no root node spreads. Rather, some features of the target are delinked, while others persist in the representation. The target then receives features from the providing segment, undergoing partial assimilation. Kavitskaya (2014) makes a brief note that consonant CL can be reanalyzed as assimilation, but it is not the focus of her study.

For our analysis, we adopt Hayes's (1989) model of CL in Moraic Theory[5], where CL corresponds to root node assimilation: a segment deletes entirely, and the moraic position is replenished with an entire neighbouring matrix. However, we will use the term (compensatory) lengthening as an analysis-neutral umbrella term for any spreading process that follows a total or partial deletion and outputs a phonetically long segment, whether phonologically represented as long or not. *Gemination* will be reserved for total assimilation between contoids, and *pseudo-gemination* for partial assimilation between contoids.

(9) is a representation in Moraic Theory of a diachronic CL_{CVC} case from Latin.

(9) kasnus > /kaːnus/ 'gray'



Two processes are involved in this change. On the segmental tier, where the moraic coda /s/ of the first syllable deletes before anterior sonorants, leaving its corresponding mora stranded. Next, on the prosodic tier, the adjacent tautosyllabic vowel /a/ associates to the vacated mora, becoming a long (bimoraic) vowel. We hold that segmentally unaffiliated moras lengthen vowels by default, perhaps in every language. For Chilean, we are forced to claim that the mora stranded from the deletion of /s/, for example, is provided with the segmental material of the following /l/ onset, creating a geminate: /mas#lindo/ → [mállíndo] 'more pretty.' Even though Chilean seems to exclusively lengthen consonants, stating CL as a rule with a restricted focus (i.e. only lengthen consonants) is undesirable (Dresher, 1985), and languages are not able to derive long segments that do not already have a length contrast in the inventory (De Chene & Anderson, 1979). Hayes (1989) proposes a language-specific parametrical directionality for CL to explain vowel versus consonant lengthening. However, Chilean cannot spread features from right to left because final-deleted /s/ does not trigger CL if the following domain is vowel-initial: /los+aros/ → [lo.áros] *[lo.áːros] 'the earrings.'

Under this framework, we will defend the position that Chilean CL is not a case of gemination, but a case of partial assimilation, through which pseudo-geminates are derived. Our goal is to show that vowel lengthening is the default outcome of CL, and that restricted cases of "gemination" can be reanalyzed as pseudo-gemination, rather than total assimilation. This view could be potentially extended to other languages with seemingly derived geminates.

[5]We could have used a CV Tier or an X Tier here, but Moraic Theory has been consistently proven to be more suitable for modern autosegmental phonology, as its predictions are more constrained.

2.2 Feature Geometry and Spontaneous Voice

Feature Geometry (Clements, 1985) offers a structured representation of the dependencies between features and articulatorily defined natural classes. By enriching segmental representations with internal structure, we gain a principled account of which features can spread, which ones block spreading, and why assimilation is restricted to specific segment interactions. By moving away from CL as a strictly suprasegmental process and toward one that extends to melodic tiers, we can constrain our theory of non-linear phonology (Goldsmith, 1990) to make narrower predictions without overgenerating surface forms.

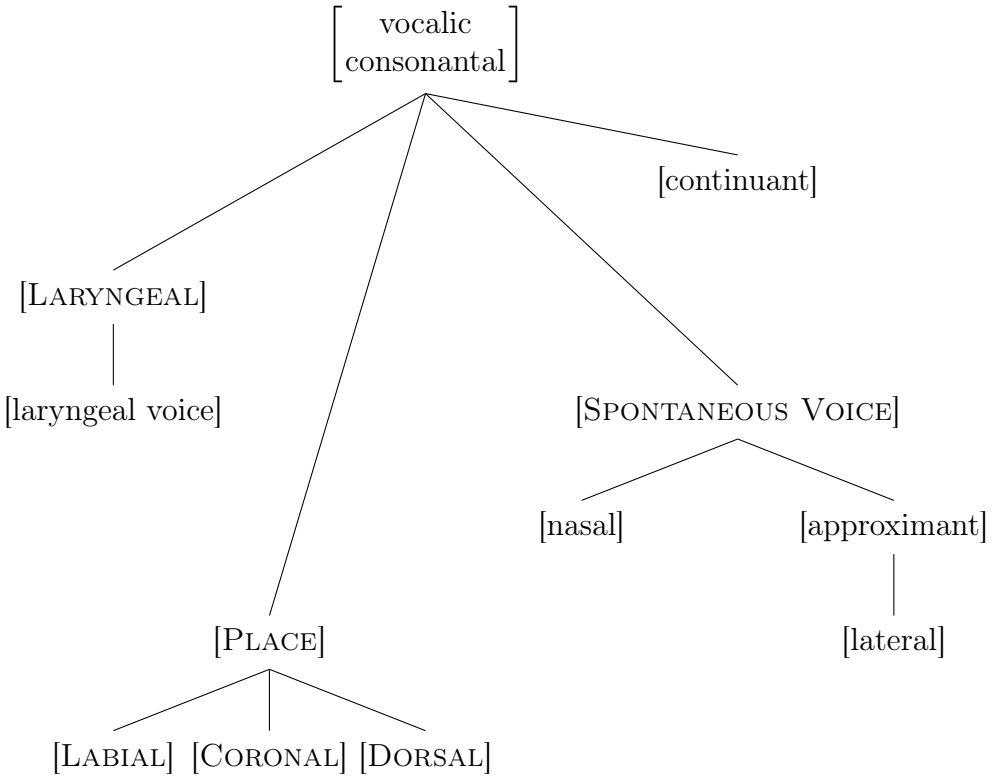
In many languages, sonorants assimilate to one another systematically (Avery & Rice, 1989) as exemplified by Toba Batak (10). Having a node that dominates features characteristic of sonorants, such as [lateral] and [nasal], is motivated based on these assimilation processes. The proposed node is what Piggott (1992) calls [Spontaneous Voicing], and Rice and Avery (1989) call [Sonorant Voice], both abbreviated as SV.

(10)

nn → nn	rn → rn	ln → ln
nr → rr	rr → rr	lr → lr
nl → ll	rl → ll	ll → ll

In this language, /n/ is analyzed with a bare [SV] node; /l/ with [lateral] as a dependent of [SV] and [continuant] as a daughter of the root; and /r/ with a bare [SV] and [cont] below the root (Rice & Avery, 1989). Features under [SV] spread into another empty [SV]; therefore, spreading does not need to trigger delinking. Instead, deletion of existing material must be independently motivated in order to vacate a node for features to target. Furthermore, the generation of entirely new features must come from separate processes because spreading alone cannot introduce new features.

(11)

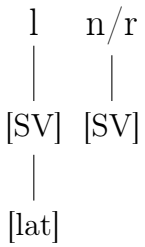


We assume the feature-geometric structure shown in (11). Additional features like [anterior] and [back] are not included for space, but are assumed to also form part of the structure. Importantly, theoretical motivation for [SV] builds on the dual realization of voicing. Since sonorants are spontaneously voiced, voicing can be activated by the laryngeal property [laryngeal voice] and by the manner feature [SV]. Languages often dissociate the two, with sonorants participating in manner assimilation but not in voicing assimilation. This supports the claim that sonorants lack a [voice] specification altogether in certain systems, bearing instead only an [SV] node. In some languages, obstruents also participate in manner assimilation with sonorants. Therefore, these *sonorant-obstruents* are also analyzed with a bear [SV].

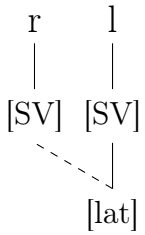
Sonorant assimilation in Toba Batak proceeds as follows in Avery and Rice (1989). In /ln/ and /lr/ (12a.), spreading cannot apply because the target /l/ has a dependent [lat] feature,[6] and the providers (/n/ and /r/) offer no features[7] that can override or supplement this. In /rl/ (12b.), [lat] spreads from /l/ to /r/, resulting in [ll]. In /nr/, [cont] spreads from /r/ to /n/, yielding [rr], but we are not concerned with this case since it does not involve [SV]. What is important is that the difference in features underneath [SV] between segment classes accounts for the asymmetrical assimilation patterns.

(12)

a.



b.



In Spanish, voiceless stops are specified only with a [LARYNGEAL] node without [voice]; voiced stops bear both [LAR] and [voice] in addition to a bare [SV]; and nasals have [SV] dominating [nas], but no laryngeal specification (Rice & Avery, 1989). This predicts that voiceless stops are purely specified for laryngeal voicing, nasals (laterals and rhotics) only for sonorant voicing, and voiced stops for both laryngeal and sonorant voicing. Like Rice and Avery (1989) and others, we assume a fully privative feature system: no negative values, only the presence or absence of features.

Beyond organizing sonorant features and acting as a spreading target, [SV] (with dependents) can itself spread and delink. In Korean, sonorants in onset position provide [SV] to preceding voiceless stops in coda position: /kukmul/ → [kuŋmul] 'soup' (Cho, 1988). Because sonorant features spread independently of other features in the representation, processes of this type cannot be captured as assimilation of all supralaryngeal features. We see that in this case, the whole [SV] node spreads from the onset to the coda.

Traditionally, all features are organized under a [ROOT] node. Some researchers treat the root as a site for features that do not behave autosegmentally (see Hall (2007) for an overview). These major class features do not spread independently of total assimilation; rather, they globally identify basic properties of the segment. We follow this view,

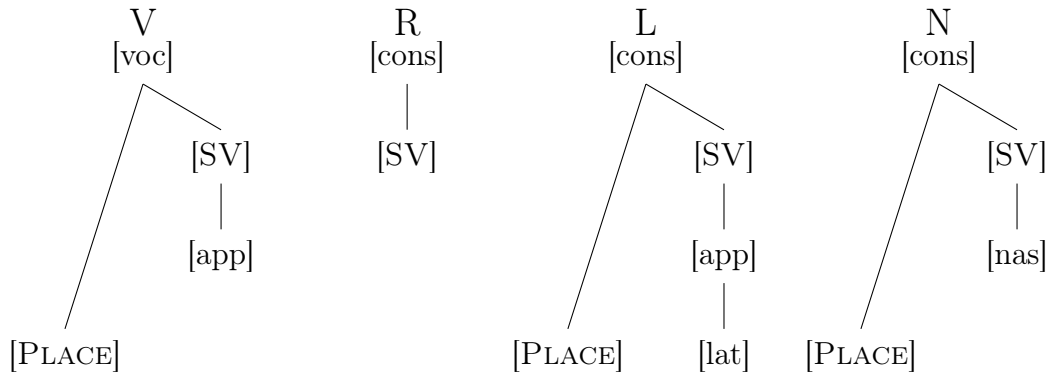
[6] Avery and Rice (1989) have [lat] as an immediate daughter of [SV], and no [app] at all. Our analysis requires [app], but alternative structures are possible.

[7] Whether nasals have underlying [nas] as a dependent of [SV] is a language-specific choice. We agree with Avery and Rice (1989) that Spanish nasals do specify [nas] underlyingly.

locating either the [consonantal] or [vocalic] feature in this position, depending on the segment. Vocoids are headed by a [voc] root, and contoids by a [cons] root. This binary root distinction will prove crucial in predicting which segments serve as viable targets in assimilation processes.

We adopt the following representations for the core segment classes of Chilean. Figure (13) illustrates the internal structure of vocoids, rhotics, laterals, and nasals.

(13)



Vocoids are identified by a [voc] root feature, [SV] dominating [approximant],[8] and specific place features as needed. Nasals have a [cons] root feature, [nasal] below [SV], and are specified for place. Lateral roots are [cons] like nasals but with [lat] and [app] beneath [SV], and possibly an obligatory [CORONAL] place. Lastly, rhotics[9] are placeless, have a [cons] root, and a bare [SV] node, making them targets for spreading. These structures will guide our analysis of sonorant interactions and segmental repair strategies in Chilean, including the treatment of rhotics and their asymmetric behaviour in assimilation processes. In the next section, we turn specifically to the representation of rhotics and their lack of place and sonorant features.

2.3 Representing Rhotics

Spanish is a challenge for our proposal because it contrasts between two rhotic phonemes: a tap /ɾ/ and a trill /r̄/ (Harris, 1983, 2002). This means we must further specify our structure to account for the tap-trill distinction, while also consolidating it with our prediction that CL assimilates coda /ɾ/ to sonorant onsets, creating pseudo-geminates.

The classification of rhotics remains one of the most debated issues in segmental phonology. Rhotics are difficult to define using traditional articulatory descriptions, and they lack shared acoustic properties that would qualify them as a uniform class. On the manner dimension, rhotics span from rhotacized vowels to fricatives and trills—too broad a range to support a unified [rhotic] feature. On the place dimension, they can be alveolar, retroflex, or even uvular, making a place-based unification equally untenable. As shown in table (14) from Wiese (2011), rhotics cross-linguistically exhibit a striking range of realizations.

[8]The representation of vowels in [SV] frameworks is not well developed, so alternative representations may be possible

[9]We diverge from Rice and Avery's (1989) claim that more structure under [SV] is correlated with higher sonority because rhotics have less specification than nasals and laterals

(14)

	Alveolar	Retroflex	Uvular
Trill	r		ʀ
Tap or Flap	ɾ	ɽ	
Fricative			ʁ
Approximant	ɹ	ɻ	
Lateral flap	ɺ		

Given this diversity, one might conclude that the class of rhotics is a historical and orthographic artifact since rhotics seem to be based more on diachronic developments and their conventional use of the grapheme <r> (Ladefoged & Maddieson, 1996). However, Wiese (2011) offers five compelling arguments for the phonological unity of rhotics, not as a phonetic class, but as a class defined by distributional and structural behaviour:

1) Interaction with adjacent segments: Rhotics often exhibit heightened interaction with neighboring vowels. In Chilean, for example, coronal stops are palatalized before rhotics in some sociolects: /tɾabaxo/ → [tʃaváxo] 'job.'

2) Phonotactic restrictions: Rhotics are often grouped together in terms of positional constraints. In Irish, two rhotic phonemes /r, rʲ/ contrast only within the word, while word-initially the contrast is neutralized to [r] (Chiosáin, 1999).

3) Syllabic structure: Rhotics tend to occupy positions adjacent to the syllable nucleus, aligning with a sonority level below vocoids but above other contoids.

4) Allophonic variation: Rhotics in cognates have a notable number of realizations in related dialects, as diachronic change between different kinds of rhotics is very common.

5) Their phonemic alternations: Rhotics exhibit restricted and predictable patterns of alternation, suggesting a unified representational status despite surface diversity.

Following this line of reasoning, we reject the notion that rhotics are defined by any specific feature. Instead, we adopt the view that rhotics are phonologically unified by their underspecified representation. They are best represented by the absence of place and manner features that would categorize them into other classes. As argued by Hall (1993) and Wiese (2003), the ability of rhotics to participate in clusters regardless of place restrictions—such as in English /pr, tr, kr/, and /pl, kl/ but not */tl/—supports the claim that rhotics lack place features altogether. Goad (2011) shows that rhotics do not enter into place constraints beyond the ones mentioned here. This immunity to homorganicity constraints suggests that rhotics do not participate in the same licensing conditions that affect fully specified consonants.

Typologically, pairs of rhotics are rarely contrastive in languages (Maddieson, 1984). Spanish and Catalan are well-known exceptions, exhibiting a two-way rhotic contrast between a tap /ɾ/ and a trill /r̄/ (Padgett, 2009). While some researchers propose that the trill is a geminate (underlyingly moraic) version of the tap (Harris, 1983, 2002), we reject this analysis and hold that the tap-trill distinction in Spanish has a representational basis unrelated to underlying moraicity. Crucially, the contrast is only preserved intervocalically; in all other positions, the two phonemes are in complementary distribution: the trill

surfaces word-initially and the tap surfaces in coda or complex onset positions. Since all rhotic-derived pseudo-geminates in our data arise from coda rhotics (e.g. /ɾn/ → [nn]), our analysis focuses on the representation of /ɾ/, whose structure is given in (13). The representation of the trill /r̄/ will be addressed in later research.

Accordingly, we analyze rhotics as lacking both place and manner features. As shown in (13), we represent the Spanish tap /ɾ/ as a segment with only an [SV] node beneath the root feature [cons]—underspecified for other features—making it a default target for spreading. This representation will be key, as it captures the structural asymmetries between coda /ɾ/ and a following onset, which cause /ɾ/ to assimilate via feature-filling, yielding a pseudo-geminate.

2.4 Glides and Vowels in Hiatus

A widespread constraint is the ban on vowels in hiatus, commonly resolved either through the epenthesis of an unmarked consonant or by gliding one of the two adjacent vowels. In Chilean, the latter strategy occurs: unstressed front vowels glide to [j], and unstressed back vowels glide to [w]. This repair is especially apparent in clitic+host sequences, where a vowel-final morpheme precedes a vowel-initial host. The failure of glide formation to apply when intervocalic deletion derives a hiatus will help motivate the stability of the root node after delinking, and in turn, how lenited /s/ derives pseudo-geminates but not long vowels. The following examples, drawn from our data and Oroz (1966), illustrate the gliding patterns:

(15)

a.	/mi+alma/	→	[mjálma]	‘my soul’
	/ni+el/	→	[njél]	‘neither him’
	/ni+otɾo/	→	[njótɾo]	‘nor another’
	/ni+uno/	→	[njúno]	‘no one’
b.	/su+alma/	→	[swálma]	‘his/her soul’
	/tu+eres/	→	[twéɾeh]	‘you are’
	/su+ora/	→	[swóɾa]	‘his/her hour’
	/su+ixo/	→	[swíxo]	‘his/her son’
c.	/te+ago/	→	[tjáɣo]	‘I make you’
	/de+otɾo/	→	[djótɾo]	‘of another’
	/de+un/	→	[djún]	‘of one’
d.	/no+an/	→	[nwán]	‘they haven’t’
	/no+es/	→	[nwéh]	‘he/she isn’t’
	/lo+iso/	→	[lwíso]	‘he/she did it’

Groups (15a.–b.) illustrate the most stable gliding outcomes, where clitic /i/ and /u/ glide to [j] and [w], respectively, forming diphthongs with the host-initial vowel. Groups (15c.–d.) are more variable, likely due to the less direct articulatory path between /e/ and /o/ and their corresponding glides. These examples reflect the phonology of Chilean specifically; for phonetic variation in hiatus retention versus diphthongization in another dialect, see Gubian, Torreira, and Boves (2015) on Andalusian Spanish.

An exception to hiatus resolution appears when adjacent identical vowels are separated by an inflectional boundary. In such cases, both vowels are retained and syllabified separately:

(16) /le-eɾ/ → [le.éɾ] 'read (inf.)'
/kɾe-eɾ/ → [kɾe.éɾ] 'believe (inf.)'

The data in (3) and (4) most closely parallel the structures in (16), where hiatus is maintained due to morphological structure, and gliding is blocked.

Spanish assigns glides to the nucleus as part of a diphthong, as supported by phonotactic constraints (Harris, 1983). In Moraic Theory, the underlying moraicity of vowels versus glides is responsible for their contrast (Hayes, 1989). However, Gómez, Figueroa, and Salamanca (2019) argue for a phonemic distinction in Chilean between 1) vocalic glides /i̯, u̯/, which occupy dependent positions in the nucleus; 2) consonantal glides /j, w/, which appear in onsets and show greater oral obstruction; and 3) a third consonant /ʝ∼ɟ/, spelled with <ll> or <y>. According to their data, vocalic glides /i̯, u̯/ correspond to the orthographic forms <i> and <u> plus a vowel, e.g. *piano* 'piano' and *puerta* 'door.' The consonantal glides are spelled with <hi> or <i> for /j/ and <hu> or <w> for /w/, e.g. *hielo* 'ice,' *iodo* 'iodine,' *huevo* 'egg,' *weón* 'douchebag' (from *huevón*; lit. guy with big eggs). Furthermore, the additional consonant /ʝ∼ɟ/ is spelled with <ll> or <y>, e.g. *llena* 'full,' cf. *hiena* 'hyena.'

We argue that this three-way contrast is overstated. The apparent complementary distribution of /i̯, u̯/ and /j, w/ is more plausibly analyzed as allophony, conditioned by position in the syllable. /j/ and /w/ may be underlyingly identical to /i̯/ and /u̯/, respectively, with their onset position resulting in increased oral constriction. Also, evidence for this neutralization comes from the Chilean realization of /j/ as a fricative [ʝ], e.g. [ʝóniko] 'ionic,' overlapping with the phonetic space of the proposed third segment /ʝ/. Similarly, sequences like those in /ɡwante/ 'glove' and /bwelta/ 'turn' can lenite and surface as [wánte] and [wélta], effectively converging with /w/.

We also note a methodological issue with Gómez et al. (2019)'s data, which is drawn from eight unspecified Chilean cities. Given the regional diversity of Chilean dialects, their conclusions may not be generalizable. For these reasons, and because our focus is on the Santiago dialect specifically, we propose a simpler, phonologically grounded system. Under our analysis, Chilean glides that are underlyingly /j, w/, are specified with [voc] just as their high vowel counterparts /i, u/, and are preferably syllabified in the nucleus as part of a diphthong, e.g. [pɾwéva] 'test,' where [pɾ] is the onset and [we] is the nucleus. In onsetless syllables with rising diphthongs like /webo/ 'egg,' glides may optionally be reanalyzed as [cons] to form onsets. This variable parse explains the wide range of /j/ realizations as [j∼j̟∼ʝ∼ɟ∼dʒ], reflecting a continuum from most vowel-like to most consonant-like articulation. Lastly, lenition of /bw/ and /ɡw/ independently creates a merger with [w].

This leaves Chilean with a three-way prosodically-based distinction between high vowels (underlyingly moraic), vocalic glides (underlyingly non-moraic and syllabified in the nucleus by default), and variable consonantal glides (syllabified in the onset). We are interested in the representation of glides because when they are word-initial, they also undergo CL after a domain-final /s/, thus patterning with segments headed by [cons]. The mechanics discussed in this section are necessary for understanding both the formation of glides during hiatus resolution and the ability glides have to become pseudo-geminates.

Summary

Deriving geminates in a language with no length distinctions is unusual, and specifying a CL rule that exclusively affects consonants is undesirable. Given that marked coda-onset clusters tend to be repaired via assimilation or spirantization, motivating the full deletion of coda /ɾ/ so that CL can output a geminate is challenging. A right-to-left parametrical directionality predicts spreading into the target from a segment to the right, thus capturing that coda targets receive features from the adjacent onset. Except, the data show that when final /s/ is followed by a vowel-initial morpheme, CL is blocked because only consonants may provide features to this position. A similar case to /s/ is that of intervocalic stops, whose apparent deletion leads to a hiatus. Because hiatus is generally resolved in Chilean, deletion of the stops and /s/ may not be total. Hence, our goal is to propose pseudo-gemination, a CL process that does not constitute root node assimilation, but assimilation at lower tiers in the melody because no root is deleted.

To better identify the environments and conditioning for CL in Chilean, we elicited and recorded speech from Santiago Spanish speakers. On this account, §3 will discuss our experimental design and data collection, while §4 will present our findings.

3 Methods

The data was collected from fourteen adult native speakers, all from the Santiago Metropolitan area, who grew up exposed to Santiago Spanish full-time. Some had lived in other Chilean cities (e.g. Temuco and Copiapó), and some in other countries (e.g. Canada and Ecuador), but briefly (maximum 2 years) or during adulthood. Eight of them were women, six were men, and all corresponded to a mid-high socio-economic status. All participants were between the ages of thirty and eighty because speakers of the same background but of younger ages lenite /s/ and lengthen sonorants after /ɾ/ less often. The participants were mostly monolingual, with some having classroom exposure to English, French, and German, and/or a non-dominant heritage language like German or Catalan. However, none of these languages were self-reported to be spoken past the intermediate level, except for two participants who worked at universities and had advanced L2 English. Every participant reported that their caregivers raised them in Santiago or Central Chilean Spanish.

For the recording sessions, participants were placed in previously acquainted pairs (i.e. family members, couples, or friends) to ensure they were comfortable conversing freely using relaxed speech. Each person sat next to their pair in front of the microphone and the investigator. The investigator was a native-speaker who fell under the age group that lenites less often. The difference in dialect involving the investigator could cause linguistic accommodation from the participants, and the formality of an interview-style session could elicit careful speech. Hence, sessions were done in pairs to record continuous native-to-native speaker conversation rather than recording individual participants' responses to questions from the investigator. Every session, each with two participants, lasted fifty minutes to an hour, contributing to a total of seven hours of recorded data across all fourteen participants.

Recall that lenition and CL processes are variable, such as final /s/ lenition (e.g. /lunes/ → [lúneh]∼[lúne] 'Monday'), while some are socially stigmatized, such as /ɾ/-derived lengthening (e.g. /bjernes/ → [bjénne] 'Friday'). During each session, participants performed three tasks to ensure the collection of ample data through different

approaches. This is necessary to confirm any effects of speech register on the forms under study by eliciting productions in different styles.

1. Free conversation task:

   To ensure participants were at ease and spontaneous speech could be collected, they were asked to talk with each other for thirty minutes. Since pairs were either related or friends, the flow of conversation was not an issue. Whenever a pause occurred for any reason, e.g. a conversation topic was exhausted, hesitation, tuning out, etc., the investigator would ask questions to prompt more speech. Otherwise, there were no further attempts to restrict the topics of conversation.

2. Sentence repetition task:

   Forms containing the target strings or contexts containing these forms that are less likely to arise exhaustively in spontaneous speech were elicited via repetition of pre-constructed sentences. For example, marked sonority profiles like *do*[ɡ.m]*ático* 'dogmatic' are useful for arbitrating between hypotheses that explain the forms under study, e.g. deletion is a repair for poor syllable contact. To ensure the collection of these specific sequences, which are much less common in high-frequency words, we assembled them into eight sentences. (17) shows some examples of these rarer sequences that were incorporated into this task.

(17) a. /ɾ/-derived CL over morpheme boundaries:
/jebaɾ+me/ → [jevámme] 'to take me'

b. /s/-derived CL not involving inflectional /-s/:
/aɾ̄os#blanko/ → [aɾ̄óvvlaŋko] 'white rice'

c. Repairs for marked coda-onset sonority profiles:
/adkiɾiɾ/ → [aðkiɾíɾ] 'to acquire'

   There were eight sentences to repeat, four for each participant in the session, so that participants would not directly replicate each other's productions after hearing the same sentence repeated by their partner first. The sentences were designed to be comparable for the two participants regarding target segments and contexts. These were pre-recorded audio files of the investigator and produced with lenition, which were played out loud on a portable speaker for the participants. The sentences were short enough to avoid the cognitive load of memory constraints but long enough so that speakers did not produce a segment-by-segment (or word-by-word) echo of the audio. The average length was 10 lexical words per sentence. This task is expected to induce more careful speech, with less lenition and CL processes.

3. Storytelling task:

   To elicit more relaxed productions involving the same kinds of rare strings as those mentioned in the sentence repetition task, we wrote two one-minute stories (stories A and B) with matching storyboards. The stories were also pre-recorded with lenition and played on a speaker for the participants, as in the previous task. The investigator flipped through the five-page storyboard of story A, which contained illustrations of the plot, while the participants watched and listened. Then, one

of the two participants was asked to retell the story to the investigator and the other participant, using the images to aid them. The same procedure was repeated with story B for the second participant. This task allows for the collection of low-frequency forms in a more informal register since target strings can be controlled to be included in words more essential to the story. Therefore, these are more likely to be repeated in the same style, even if participants are retelling the story in their own words. For this reason, both the sentence repetition task and the storytelling task are necessary to elicit all target forms in relaxed and careful registers.

We used the Zoom H4n portable audio recorder facing the participants at around one meter away. After all the data collection sessions were conducted, the recordings were uploaded onto a computer and analyzed in Praat (Boersma & Weenink, 2022). The investigator did a first filter of the data by listening to the recordings and separating /ɾ/-derived gemination, /s/-derived gemination, and voiced stop deletion productions, selecting them with text grids. Then, the spectrograms for each token were inspected for phonetic traces of the target segment and length differences on the neighbouring segments. Identifying the absence of /ɾ/ was straightforward, as the tap has a visually salient representation on the spectrogram. To identify the complete phonetic absence of voiced stops, we looked for uninterrupted vowel sequences (hiatus) with no trace of consonantal activity, i.e. obstruction resembling a stop, fricative, or approximant. The greatest challenge was examining /s/ because, though it displays rather conspicuous high-frequency frication when faithfully realized, when debuccalized to [h], it is more difficult to tell apart from [Ø]. Background white noise or breathing can easily be mistaken for [h], especially before a voiceless stop in the onset of the following word. This is because the gemination of voiceless stops phonetically involves lengthening the duration of the oral closure. By contrast, voiced stops lengthen as fricatives since they are susceptible to spirantization first. Overall, gemination of voiceless stops after target /s/, though attested, is the most difficult process to identify acoustically.

All tokens displaying /s/-lengthened segments, /ɾ/-lengthened segments, and deleted voiced stops were entered into a spreadsheet along with the following information for each token. The target segment (/ɾ/, /s/, or a voiced stop), the target underlying representation, the surface representation, the standardized Spanish orthographic form, a translation/gloss, the lengthened segment (if any), the stress environment (stress values of the syllables surrounding the target and lengthened segments), the phonological context (segments before and after the target and lengthened segments), the morphological context (which kind of morpheme the target segment is in), morphological boundary (if the process occurred over a boundary, if so, which kind), speech register (colloquial or careful, based on the task), and which participants produced it (by participant code). An example of the information for a sample token is shown below.

Meanwhile, similar tokens that did not undergo the processes were not coded because all the processes were variable but robustly attested in the data, even in careful speech. Our aim is not to achieve sociolinguistic conclusions about these patterns by running statistical tests, though this would be an ideal follow-up study. Instead, the aim of this experiment design is to gather evidence for the reality of the phonological processes to be analyzed herein and to identify any factors that may condition the realization of target forms to inform and refine our theory, while ruling out potential confounds. In other words, we are focused on the phonologic processes themselves, not on quantifying their variation.

4 Results

By comparing data across our different tasks, we found that CL is more likely to occur in relaxed speech overall. Relaxed speech during the free conversation task contained the most instances of lenition and CL, while the storytelling task contained the least. We noticed that participants who were elementary school teachers or parents of toddlers code-switched into a "narration" register during this task. They implemented a slow-paced and carefully articulated speech style when performing the task, as if reading a book to a child.

Regarding the voiced stops, our data agree with the literature that intervocalic position is an invariable environment for lenition. Voiced stops in this context can spirantize or lenite further and become approximants. Deletion of the voiced stops is also common and exclusive to intervocalic position.

(18)	/estubo/	→	[estú.o]	'it was'
	/abeɾ/	→	[a.éɾ]	'to have'
	/koɾtado/	→	[koɾtá.o]	'cut'
	/mudaɾ+se/	→	[mu.árse]	'to move houses'
	/me+gusta/	→	[me.úhta]	'I like it'

In monomorphemic words, hiatus is evident even in forms such as /nada/ → [ná.a] 'nothing,' where V_1 and V_2 are the same quality, because the stress values for the two vowels differ, suggesting they are in separate syllables and not a single long vowel. That is, f_0 drops from V_1 and V_2 in [ná.a] and the length is greater than a monosyllabic form with a diphthong (e.g. [naj]), though a more detailed phonetic analysis would be a beneficial follow-up.

Only one case of deletion of the velar stop was observed in our entire data, which is shown in (18). Out of the three voiced stops, elision of /g/ is reported to be the least common by far (Verdugo Maturana, 2019). Yet, having a single participant produce an elided /g/ in a clitic+host construction was unexpected. Notably, voiced stop deletion is less common over clitic+host boundaries than morpheme-internally, but in cases where it takes place over a boundary, the surrounding vowels are also immune to gliding. This is interesting because clitic+host constructions without an intervening voiced stop do undergo hiatus resolution. Compare /mi+alma/ → [mjálma] 'my soul' with /mi+deɾetʃa/ → [mi.eɾétʃa], *[mjeɾétʃa] 'my right,' where glide formation is blocked despite the deletion of /d/ outputting a hiatus environment.

4.1 Environments for /ɾ/-Derived Lengthening

Coda /ɾ/ is only capable of lengthening sonorant consonants. It was particularly common in our data for /ɾ/ to trigger CL in monomorphemic words containing /ɾ/-sonorant strings (19a.). Spanish infinitive verbs always end in /ɾ/ and many Spanish clitics begin with sonorant consonants, so infinitive+clitic sequences are also common contexts for CL (19b.).

The location of stress relative to the deleted target segment did not play a substantial role in predicting the likelihood of CL. Coincidentally, all the verb+clitic forms have primary stress on the stem-final syllable closed by /ɾ/, but as exemplified by the bare form [jénno] and diminutive [jenníto], CL happens uniformly across differing stress environments.

(19) a.

/ɾmana/	→	[emmána]	‘sister’
/foɾma/	→	[fómma]	‘shape’
/fiɾma/	→	[fímma]	‘signature’
/jeɾno/	→	[ɟénno]	‘son-in-law’
/jeɾn-ito/	→	[ɟenníto]	‘little son-in-law’
/feɾnanda/	→	[fennánda]	‘Fernanda’
/tʃaɾla/	→	[tʃálla]	‘chat’
/paɾlante/	→	[pallánte]	‘speaker’
/buɾlaɾ/	→	[bullár]	‘to make fun of’

b.

/poneɾ+me/	→	[ponémme]	‘to put on myself’
/agaɾ̄aɾ+me/	→	[aɣaɾ̄ámme]	‘to get myself into a fight’
/meteɾ+nos/	→	[meténnoh]	‘to put ourselves in’
/aɾ̄eglaɾ+nos/	→	[aɾ̄eglánnoh]	‘to fix ourselves up’
/bendeɾ+la/	→	[bendélla]	‘to sell it’
/mostɾaɾ+le/	→	[mohtɾálle]	‘to show him/her’

Though /ɾ/-derived CL is most common in monomorphemic words and over morphological boundaries like host+clitic sequences, some cases were found over word boundaries but always within the same XP. For example, in the verb phrase *cuidar la casa* ‘to take care of the house,’ the /ɾ/ at the end of the verb *cuidar* lengthens the /l/ at the beginning of the definite article *la*, yielding [kuidálla kása].

The process of /ɾ/-derived CL is constrained both segmentally and morphosyntactically: only sonorant onsets participate in lengthening, and the phenomenon is most robust within monomorphemic words or across morphological boundaries like clitic attachments. Though rarer, instances across word boundaries further support the role of prosodic structure, as they are restricted to within the same XP. Additionally, the process does not appear to be driven by stress position. Productions of /ɾ/-lengthened sonorants were more often observed in the male participants and were less often observed in the younger participants. Importantly, variable distribution across speakers suggests ongoing sociophonetic conditioning. These observations point to a grammaticalized, yet phonetically gradient process shaped by both structural and social factors.

4.2 Environments for /s/-Derived Lengthening

/s/-final clitics commonly lengthen the onsets of their hosts, e.g. definite articles and nouns. After a final-deleted /s/, the following domain may begin with any consonant or vowel. Lengthening of glides, laterals, nasals, and fricatives behaves as expected, with /s/-derived CL simply outputting long versions of each of these segments (20a.). When voiced stops lengthen, they do so in their spirantized form (20b.). If we assume that /s/ fully deletes, the resulting geminate stop would become intervocalic, possibly undergoing spirantization at this stage. However, rules that apply to singletons generally do not apply to their geminate counterparts (Schein & Steriade, 1986), so stating a spirantization rule for Spanish that applies to singletons and geminates alike would be unreasonable, especially given that Spanish has no lexical geminates. Instead, since a variable environment for spirantization is after /s/ (Carreira, 1998), we conclude that a voiced stop is spirantized via [cont] spreading from preceding /s/ (Mascaró, 1984) before being legnthened.

(20) a.

/los+webos/	→	[lowwévo]	‘the eggs’
/las+jabes/	→	[lajjave]	‘the keys’
/las+lixamos/	→	[lallixámo]	‘we sanded them’
/sabis#lo/ (*que hice*)	→	[savíllo]	‘you know what (I did)’
/dos+niɲos/	→	[donníɲo]	‘two children’
(*cuatro*) /dias+mas/	→	[díammá]	‘(four) more days’
/nos+fwimos/	→	[noffwímo]	‘we left’
/mis+xefes/	→	[mixxéfe]	‘my bosses’

b.

(*lo*) /pasamos#bjen/	→	[pasámovvjén]	‘(it) was a good time’
/antes+de/	→	[ánteððe]	‘prior to’
/los+globos/	→	[loɣɣlóvo]	‘the balloons’

Lengthening of voiceless stops, which is less common, is particularly difficult to detect because one of the phonetic cues for a geminate stop is longer oral closure before the release. This longer break may have a faint egressive airflow, corresponding to an [h]—the debuccalized allophone of /s/—and not a fully deleted /s/.[10] Thus, determining whether final /s/ is simply debuccalizing to a weak [h], or if voiceless stops are truly becoming geminates (not representationally) is on a phonetic continuum. (21) shows some potential cases of voiceless stop lengthening.

(21)

/las+kabɾas/	→	[lakkábɾa]	‘the goats’
/bwenos+per̄os/	→	[wénopper̄o]	‘good dogs’

Unlike /ɾ/-lengthened segments, /s/-lengthened segments are very unlikely morpheme-internally. In our data, the only cases of /s/-derived CL in monomorphemic words were in the function words /desde/ ‘since’ and /mismo/ ‘same’ ([déððe] and [mímmo]). Otherwise, /s/-derived lengthening occurs over morpheme boundaries, namely in clitic+host constructions, in prepositions before their objects, and sometimes over larger boundaries, such as over /s/-final copula verbs and predicates: /es#muj r̄aɾo/ → *e*[mm]*uy raro* ‘he’s very strange.’ This is likely because all coda /s/s can debuccalize to [h], but only domain-final position allows for further lenition (partial deletion), thus leading to CL.

As with the voiced stops, a hiatus outputted by the (representationally partial) deletion of /s/ is not subject to resolution like other parallel environments without an intervening /s/. Compare /la+imaxen/ → [lajmáxen] ‘the image’ with /las+imaxenes/ → [la.imáxenes] ‘the images.’ Additionally, when the onset following a lenited /s/ is a rhotic, the result is a long trill: /los+r̄egalos/ → [lor̄ːeɣálo] ‘the gifts.’ In a future investigation, we will address the representation of the tap-trill contrast and the derivation of a long trill as distinctly longer than a singleton trill, which in turn, is not the geminate counterpart of the tap.

We propose that /s/-derived lengthening was more uniformly observed across our participants because, though /s/ debuccalization to [h] is prestigious (Bolyanatz, 2018), /s/ becoming [Ø] is not as socially stigmatized as /ɾ/-derived lengthening. In our preliminary examination, all participants displayed /s/-derived lengthening at similar rates, with no prima facie evidence of having a correlation with age or gender.

[10]For plural forms in the presented data (e.g. /los+webos/ ’the eggs’), the plural clitic variably lengthens the host onset. When this happens, it is common for the noun-final plural /-s/ to also lenite.

While /s/-derived CL may affect a variety of segment types, its phonetic consequences vary by segment class. Sonorants and fricatives lengthen normally, while voiced stops undergo spirantization before lengthening. Voiceless stop lengthening remains phonetically ambiguous, often overlapping with weak [h] realizations, blurring the line between lengthening a neighbour and leniting. Unlike /ɾ/-derived CL, /s/-derived CL is strictly a boundary phenomenon, concentrated in morphosyntactic edges. Socially,[11] this process appears less marked: /s/-lengthened segments were produced more uniformly across speaker groups, suggesting that while phonetically variable, this pattern is more fully integrated into the phonological grammar of Chilean.

5 Discussion

This section evaluates whether CL in Moraic Theory can account for the patterns observed in Chilean Spanish. We conclude that gemination is not supported for this variety. As an alternative, we propose a representation in Feature Geometry that operates solely on the melody, preserving the association between segmental and prosodic tiers throughout the derivation. Ultimately, we argue that Chilean lacks both lexical and derived geminates, as true geminates share all segmental features. Instead, CL in Chilean derives pseudo-geminates, which show partial convergence at lower structural levels.

5.1 Attempting Gemination in Chilean Spanish

CL analyses that derive geminates require two key mechanisms: deletion of a segment and lengthening of an adjacent consonant (Kavitskaya, 2014). The deletion step occurs on the segmental tier—i.e., rules that elide /ɾ/ and /s/, thereby delinking their melodies from coda-assigned moras. The lengthening step then spreads the root node of the adjacent consonant into the vacated mora position. However, this approach faces multiple challenges with Chilean, both in justifying the deletion rules and in constraining when and how CL occurs.

5.1.1 Coda /ɾ/ Assimilation

Coda /ɾ/ only triggers gemination when followed by sonorants (/m, n, l/). This could be formalized as a rule deleting /ɾ/ before /m, n, l/, followed by a global lengthening rule. However, this raises the question: why is /ɾ/ deleted in these contexts?

One possibility is that /ɾ/, as a liquid, forms poor syllable contact with following nasals or liquids (Bybee, 1976; Murray & Vennemann, 1983). The resulting sonority profile of a coda-onset cluster may be ill-formed and require repair. While deletion of the offending coda segment is a conceivable repair strategy, Chilean more commonly favours lenition or assimilation in such contexts.

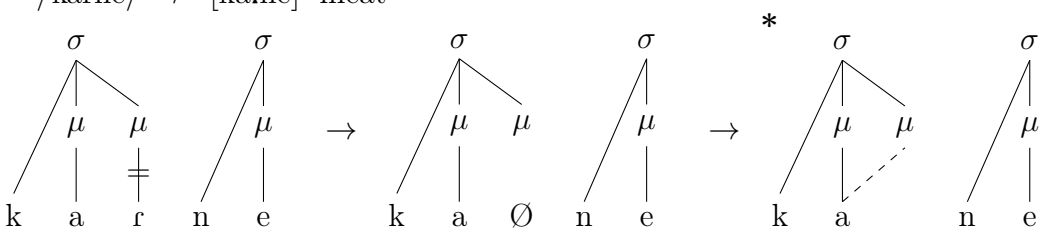
(22)	a.	/dogmatiko/	→	[doɣmátiko]	‘dogmatic’
	b.	/ignasjo/	→	[iŋnásjo]	‘Ignacio’
	c.	/doktoɾ/	→	[dokˈtóɾ]	‘doctor’

[11] Native speakers are aware of /s/ debuccalization but not of CL. Cases of /s/-derived CL are reported as "not pronouncing" /s/ by natives; no remarks on onset lengthening. /ɾ/-derived CL also goes unnoticed, but when pointed out to them, speakers comment it is "low-class" or "poor diction."

Chilean typically resolves problematic clusters, not through deletion or epenthesis, but by featural adjustments that output unfaithful alternatives that are more harmonious with their prosodic context. For instance, in a stop-nasal sequence (as in 22a.), the stop may spirantize through [cont] spreading, a process that resembles spirantization of voiced stops (Mascaró, 1984), or the coda may assimilate sonorant features licensed by the onset to increase sonority. Crucially, these repairs involve spreading existing features into empty positions, rather than inserting new ones. A nasal-nasal cluster (as in 22b.) may be less optimal than a lateral-nasal one, but [lat] cannot be inserted from nowhere, so to ameliorate a stop-nasal cluster, a nasal-nasal cluster is the best option given the available [nas] feature. In the absence of sonority-boosting features or permissible spirantization—e.g., in voiceless stop-stop clusters (as in 22c.)—the coda may simply become unreleased, but not deleted.

Independently of its motivation, if the segmental content of coda /ɾ/ delinks parasitically (as in 23), the tautosyllabic vowel would naturally reassociate to the floating mora. The following consonant would remain in the onset position, with no need to resyllabify or lengthen.

(23) /kaɾne/ → *[ká꞉ne] 'meat'



None of these strategies, however, result in long vowels, suggesting that full deletion with concomitant CL_{CVC} is not at work in Chilean.

Given this, why are long vowels the preferred outcome of CL cross-linguistically? Underlying vowels bear an abstract property correlated with prominence, which is represented by the mora. In Moraic Theory, a rule that forces a stranded mora to seek out a consonant melody would be marked. Defining specific moras as "consonantal" would preclude reassociation by vowels—opposing the cross-linguistic observation that delinked moras regularly reassociate with vowels, as in CL_{CVC} and CL_{CVCV} processes. Overall, the grammar of a language with no underlyingly moraic consonants should not be said to designate consonants to vacated moras because a mora is partial to vowels. When a coda has its segmental material delinked, the tautosyllabic vowel can absorb the stranded mora, given its inherent compatibility with mora-bearing.

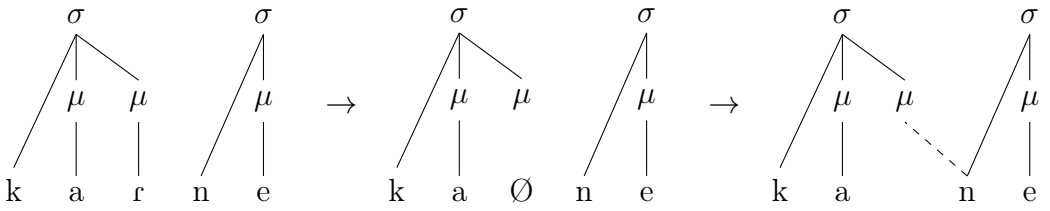
Additionally, we have been treating CL as a phonological rule, but scholars find this unsatisfactory (Ingria, 1980; Steriade, 1982). A long vowel outcome aligns with the nature of CL as a universal repair, rather than a language-specific rule. If CL were a rule like any other, every deletion rule in the grammar that is accompanied by lengthening would need to be ordered before CL. Therefore, this model would keep moras stranded through multiple stages in the derivation before the CL rule provides them with segmental material again—an unsupported assumption (Dresher, 1985). Instead, viewing CL as a feature-filling repair reflex, immediately following every deletion is more tenable.

Spanish, lacking a length distinction, is not a language where CL would be expected to output geminates or long vowels. CL requires a pre-existing length contrast for the corresponding segment (De Chene & Anderson, 1979), and vowel lengthening is a far more common outcome cross-linguistically, even in languages with both geminates and

long vowels (Kavitskaya, 2014). In languages like Tiberian Hebrew (Lowenstamm & Kaye, 1986), coda deletion leads to consonant lengthening, but the effect is restricted (e.g., not applying to guttural onsets), further suggesting that such patterns do not reflect robust CL processes. Though the authors consider this case to be a preference for gemination above vowel lengthening, we provide our alternative explanation in §5.2.4, where consonant CL follows from a partial deletion and vowel CL follows from a total deletion.

In summary, long vowels are the default output of CL following a full deletion. Gemination cannot be derived simply by designating consonants as the focus of CL, nor can CL be treated as an ordinary rule. To get around these issues, Hayes (1989) suggests modelling gemination as right-to-left spreading and vowel lengthening as left-to-right spreading. Other prosodic systems like stress or tone association have directionality, but this parameterization would need strong justification for Chilean. Our data could suggest coda deletion accopmanied by onset gemination, reflecting regressive spreading into the empty slot (24), but this interpretation still assumes a marked outcome in a system that lacks phonemic length.

(24) /kaɾne/ → [kánne] 'meat'



Unless CL is directionally parameterized, a rule that exclusively spreads consonantal material into a floating mora is problematic. Vowels are inherently moraic in all languages, while consonants can be underlyingly moraic (lexical geminates) or parametrically assigned a mora through Weight-by-Position (Hayes, 1989). Both of these paths to consonant moraicity are language-specific. In Spanish, no consonant is mora-bearing by default, since the language lacks lexical geminates and codas are assigned a mora through an additional step in the derivation (i.e. Weight-by-Position). Whereas, vowels freely carry underlying moras in every language. Thus, if moras preferentially dominate vowels, any grammar that blocks this association in favour of a consonant is highly marked, leading us to search for an alternative account.

5.1.2 Domain-Final /s/ Assimilation

Word-final /s/ was found to trigger the CL of any consonant at the start of the following domain. This is particularly common in clitic+host constructions, such as /nos+fwimos/ → [noffwímo] 'we left,' where the final /s/ in /nos/ lenites, resulting in the lengthening of the initial /f/ in /fwimos/. In contrast, the /s/ in /fwimos/ deletes with no effect when it is not followed by another word within the same syntactic XP projection. In general, coda /s/ in Chilean can optionally lenite to [h], and in word-final position, it may also lenite further to [Ø]. For instance, in /nos+fwimos/ (25), multiple surface realizations are possible depending on whether each /s/ is realized as [s], [h], or [Ø]. Though later we will argue otherwise, we will temporarily assume that [Ø] is a fully deleted /s/ in order to consider an analysis wherein /s/-derived CL constitutes right-to-left total assimilation (gemination).

(25) /s/ retained: [nosfwímos]
/s/ debuccalized: [nohfwímoh]
/s/ deleted (with CL): [noffwímo]

Word-medial coda /s/ can also lenite to [h] but it rarely deletes. [Ø] is restricted to a few high-frequency function words such as /desde/ 'since' and /mismo/ 'same', triggering CL: [déððe] and [mímmo]. Notably, whether /s/ is a plural marker does not seem to influence the likelihood of lenition, and stress placement appears to have no significant effect either. With the relative frequency and consistency of the clitic+host pattern taken into consideration, we focus our analysis on this environment.

Unlike with coda /ɾ/, leniting domain-final /s/ is more easily easily motivated, as lenition of coda /s/ is well-documented in coastal varieties of Spanish (Lipski, 1994). In Chilean, the preference for [h] in word-medial codas and the greater likelihood of [Ø] in word-final position suggest two distinct lenition processes: debuccalization and deletion. We treat these as separate, optional rules rather than a single gradient process. Debuccalization deletes the place features of /s/, yielding the glottal fricative [h]. This applies to all syllable-final positions in (26).

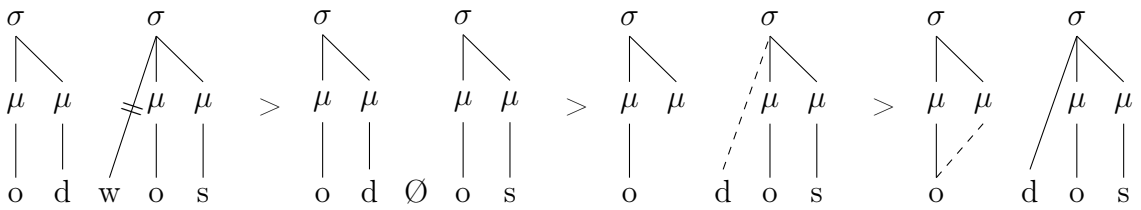
(26) /s/ → [h] / _]$_\sigma$

We propose that the second rule applies to [h] only at domain boundaries within the same syntactic projection. For simplicity, we assume this rule is fed by debuccalization, and does not delete /s/ directly, although the reverse is also plausible.

(27) [h] → Ø / _ a boundary within the same XP

Following the deletion rule, /s/ delinks from its mora, and CL may apply. As argued earlier, CL should not be specified to target only consonants, as moras preferentially dominate vowels. This notion is reinforced by double-flop derivations, such as in East Ionic Greek (28), where deletion is repaired by vowel lengthening and resyllabification of a coda (Steriade, 1982; Hayes, 1989).

(28) odwos > /oːdos/ 'threshold'

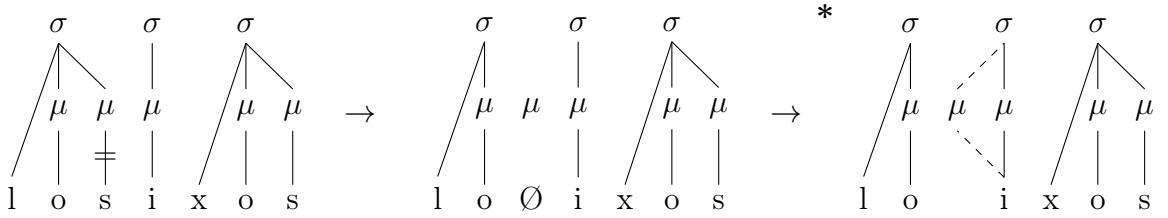


In this example, the elision of /w/ from the onset results in the unwanted syllabification [od.os]. The coda /d/ reassociates as the onset of the second syllable, and the empty mora then receives features from the preceding vowel, yielding /oːdos/. A simpler repair—resyllabifying /d/ without abandoning its rhyme position in the first syllable—could produce a geminate /oddos/. The mora would remain dominating /d/, and only one new association would be required. Despite being more economical, this option is dispreferred, supporting the idea that vowels are the default targets of CL. Gemination is avoided by resyllabifying the /d/ as a singleton onset, creating the environment for CL_{CVC}.

We maintain that CL is not a standard phonological rule—it cannot selectively target segments, and vowel lengthening occurs in the unmarked case when a mora is left vacant. However, we now consider the possibility that CL may be parametrically directional, like tone or stress assignment. If CL in Chilean is right-to-left, then after the deletion of final /s/, the onset of the following word spreads regressively into the empty mora. This analysis predicts strictly local lengthening, i.e. no double-flop derivations. Only immediately adjacent segments can spread into the vacated position; distant vowels cannot. For example, in /pjeɾna/ 'leg' the adjacent /n/ can geminate ([pjénna]), but the following /a/, despite being a vowel, cannot spread back to create a long vowel (*[pjéna:]). Thus, whether CL outputs a geminate or a long vowel is simply a function of spreading direction.

For /ɾ/-derived CL, if the (supposed) deletion rule applies before sonorant consonants, directionality accounts for why only /m, n, l/ geminate. Meanwhile, since onsets are not obligatory in Spanish, final-deleted /s/ may be followed by vowel-initial words. In such cases, a right-to-left CL parameter would predict vowel lengthening, as the vowel to the right of the empty mora is immediately adjacent

(29) /los+ixos/ → *[lo.i:xoh] 'the sons'



Yet, this prediction fails. When /s/ deletes before a vowel-initial word, both vowels remain short, in hiatus. No lengthening occurs, which would imply CL only applies to consonants—contradicting our earlier claim that vowels are prioritized. Thus, directional CL cannot fully account for the data. While some derivations like (30a.) are compatible with a directionality specification, others (30b.) predict illicit forms.

(30)

	Underlying form		/s/-deletion		R-to-L spread	
a.	/las+kabɾas/	→	laØ kabɾas	→	[lakkábɾas]	'the goats'
	/los+globos/	→	loØ globos	→	[loɣɣlovos]	'the balloons'
	/mas+fweɾte/	→	maØ fweɾte	→	[máffwéɾte]	'stronger'
	/mis+njetas/	→	miØ njetas	→	[minnjétas]	'my nieces'
	/las+lixamos/	→	laØ lixamos	→	[lallixámos]	'we sanded them'
b.	/los+ixos/	→	loØ ixos	→	*[lo.íːxos]	'the sons'
	/nos+amamos/	→	noØ amamos	→	*[no.aːmámos]	'we love ourselves'
	/mis+alumnos/	→	miØ alumnos	→	*[mi.aːlúmnos]	'my students'

A noteworthy case of CL is that of glides. Recalling that Spanish glides /j, w/ are syllabified in the nucleus (Harris, 1969). In Chilean, these [vocalic] glides in rising diphthong, may be reanalyzed as [consonantal] onsets in onsetless syllables. When /s/ deletes before a glide-initial word, the glide behaves like a consonant and undergoes gemination.

This might tempt us to reinstate a consonant-specific rule for CL. However, given that directionality fails to explain the lack of vowel lengthening, and CL does not behave like a typical phonological rule, it is unjustified to do so. Moreover, Chilean lacks both lexical

(31)

Underlying form		/s/-deletion		R-to-L spread	
/las+jabes/	→	laØ jabes	→	[lajjáveh]	'the keys'
/los+webos/	→	loØ webos	→	[lowwévoh]	'the eggs'

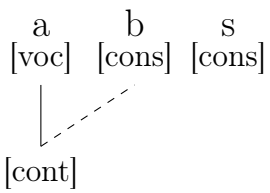
geminates and phonemic vowel length, meaning neither should be derivable through CL in the first place. All this evidence points to the same conclusion: a CL-based analysis of Chilean gemination is empirically inadequate. In the following section, we propose an alternative representation using Feature Geometry that does not rely on moraic reassociation but instead captures surface geminate-like patterns through segmental structure.

5.2 Pseudo-Gemination

In the previous section, we explored the option that coda /ɾ/ and final /s/ delete entirely, triggering compensatory gemination of the following onset. In such cases, gemination (total assimilation), where the target segment assumes all the features of the deleted segment, yields a fully converging feature matrix spread across two prosodic positions. Crucially, in true gemination, all features dominated by both prosodic positions are shared, meaning that geminates are distinguished from singletons by their representation within the prosodic frame. Specifically, a geminate involves a single melody linked to a mora—syllabified in the rhyme of one syllable and simultaneously in the onset of the next. For Chilean, however, we argue that this representation does not capture the relevant data. Instead, we propose that Chilean has what we term *pseudo-geminates*: contoids that are nearly—but not entirely—assimilated. Unlike true geminates, pseudo-geminates consist of two distinct root nodes, each occupying an independent prosodic position, but with considerable overlap in their segmental features. This featural overlap results in forms that are acoustically and perceptually identical to geminates, though their representation remains distinct. In the remainder of this section, we propose that /ɾ/ and /s/ in Chilean do not trigger gemination, but instead lead to the formation of pseudo-geminates through near-total assimilation to the following onset.

Returning to the syllable contact repairs presented in (22), we can reinterpret these patterns as cases of assimilation. In the form /ignoɾansja/ 'ignorance,' the less sonorous coda /g/ contrasts with the more sonorous onset /n/, due to the [nas] feature in /n/. One repair strategy is to increase the sonority of the coda segment by spreading the feature [cont] from the preceding vowel, spirantizing /g/, and yielding [iɣnoɾánsja]. The same strategy applies to stop-fricative clusters, as in /absuɾdo/ → [avsúɾðo] 'absurd,' where [cont] spreads from /a/ to /b/, resulting in [v].

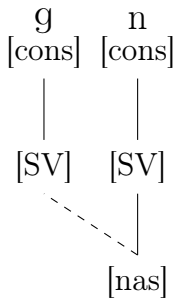
(32) /absuɾdo/ → [avsúɾdo] 'absurd'



An alternative repair involves manner assimilation through sonorant spreading. Voiced stops, which are minimally specified with a bare [SV] node and lack [cont], are proper subsets of nasals (Rice & Avery, 1989; Avery & Rice, 1989). Consequently, a stop like /g/

in a /gn/ cluster may assimilate in manner to the following nasal by acquiring the [nas] feature. This yields a nasal [ŋ], preserving the dorsal place of articulation, resulting in outputs such as [iŋnoɾánsja].

(33) /ignoɾansja/ → [iŋnoɾánsja] 'ignorance'



These processes are instances of feature-filling, whereby a segment lacking certain features adopts them from a neighbouring, more richly specified segment. If the provider has a position that is a superset of a corresponding position in the target, features that are c-commanded by that position will be shared with the target to repair the asymmetry. In a cluster like /gm/, the [SV] node of /g/ is a subset of the [SV] node of /m/, which c-commands [nas]. Therefore, [nas] may fill the empty [SV] position in the coda segment as a phonotactic repair.

Feature-filling is de facto only licit when the target lacks the relevant feature; it cannot delink existing features. To illustrate this restriction, suppose a coda consonant like /g/ dominated a different feature under [SV], such as [app]. In that case, the spreading of [nas] from the following onset would be blocked, as the target [SV] node would no longer be empty (see 5d.). Furthermore, feature-filling can not insert new features. For example, a cluster like /gm/ cannot be repaired as [lm], because [lat] is not available from either segment and cannot be introduced out of the blue. Therefore, only repairs involving spirantization or manner assimilation—those which operate on available features—are attested in Chilean. Even though an output nasal-nasal sonority profile is not as ideal as a lateral-nasal cluster, for example, it is the best available option given the conditions for feature-filling.

When spirantization serves as the repair strategy, [cont] may spread from a preceding vowel, even in the absence of a subset relationship between the target and provider. This is allowed because spirantization is an active process observed in Spanish, independent of feature-filling. As such, in a form like /dogmatiko/ 'dogmatic,' the grammar may either apply spirantization to yield [doɣmátiko] or nasal assimilation to yield [doŋmátiko]. These two strategies are in free variation and need not be sequentially ordered, as each constitutes an independent phonotactic repair.

The central conclusion is that Chilean employs feature-filling as a repair mechanism, particularly involving assimilation of sonorant features via the [SV] node. This process underlies the formation of pseudo-geminates and informs our broader argument that CL, at least in the traditional total assimilation sense, does not account for the data. Rather, segmental repairs like feature-filling offer a more empirically grounded explanation.

5.2.1 Intervocalic Lenition

A considerable body of literature has addressed the phenomenon of voiced stop lenition across Spanish dialects (Harris, 1969; Mascaró, 1984; Carreira, 1998; Lozano, 1978).

There is general consensus that lenition constitutes a weakening in articulation, typically manifesting as the spirantization of stops, the opening of fricatives into approximants, and, in some cases, segmental deletion (Kingston, 2008; Figueroa Candia, 2016; Escure, 1977). Our findings are consistent with this literature in identifying /d/ as the most susceptible to lenition overall (Díaz-Campos & Wheeler, 2021), and that intervocalic position appears to invariably trigger lenition across dialects (Carreira, 1998; Amastae, 1989). This section presents a formal account of the lenition processes affecting voiced stops in Chilean, with special attention to their representation in intervocalic position because a hiatus resulting from a seemingly elided intervocalic stop is not resolved, similar to word-final /s/ before a vowel-initial word.

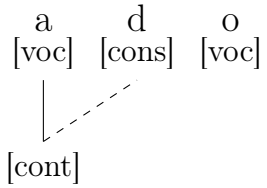
Lenition of a voiced stop in Chilean consistently occurs either when the stop is preceded by a [continuant] segment or when it is situated in a prosodically weak position, such as word-final. Following Mascaró (1984), we analyze spirantization as the forward spreading of the [cont] feature.

(34)

UR		Spirantization		Approximantization		Elision	
/pabo/	→	pavo	→	pă̬o	→	pao	'turkey'
/lado/	→	laðo	→	lă̬ðo	→	lao	'side'
/pago/	→	paɣo	→	pă̬ɣo	→	pao	'I pay'

Empirical data shows that elision is most frequent with /d/, followed by /b/, and least common with /g/, and that deletion is more likely after stressed vowels (Verdugo Maturana, 2019). Given that many Spanish inflectional suffixes contain /d/ or /b/, the difference in susceptibility to deletion between stops may be morphologically conditioned. In our data, all three stops underwent spirantization and approximantization in intervocalic position; however, deletion of /g/ was rare, observed in only one participant, suggesting some level of resistance. This resistance may be representational: since vowels are [DORSAL], the dorsal place node of /g/ could be protected by association with surrounding vowels, similarly to the geminate preservation hypothesis from Schein and Steriade (1986) or geminate inalterability from Hayes (1989). Nonetheless, in all cases, [cont] spreads from a preceding vowel to yield a fricative, thereby requiring less articulatory effort to maintain voicing during oral obstruction.

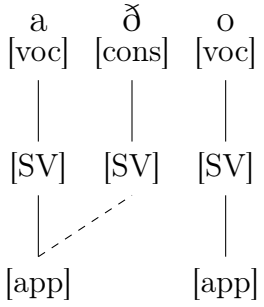
(35) /lado/ → [laðo] 'side'



In word-initial position, reducing oral closure is unnecessary because the preceding context (typically a pause) already provides an oral closure. In contrast, when a voiced stop follows a vocoid, sustaining vocal fold vibration while attaining oral closure requires intensification of muscular effort to prevent the disruption of voicing (Piñeros, 2001). This explains why intervocalic environments are particularly conducive to lenition.

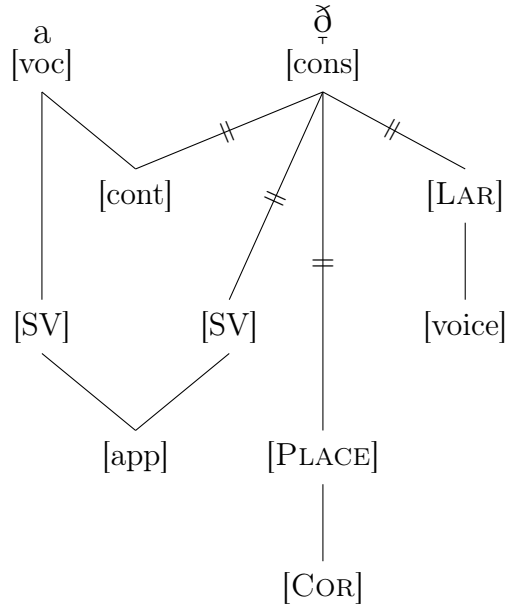
The next step in lenition is approximantization, whereby the feature [approximant] spreads from the preceding vowel to the stop. The [app] feature is dominated by the [SV] node of the vowel and fills the empty [SV] node of the target consonant.

(36) laðo → [lað̬o] ‘side’



As an approximant, the target becomes maximally sonorous among contoids. However, further reduction of supralaryngeal pressure to alleviate the transition between vowels is no longer achievable via feature spreading alone. Delinking of individual features does not suffice: removing [app] returns a fricative, and removing [cont] returns a stop.[12] Instead, Chilean resorts to a more radical strategy: it deletes all supralaryngeal and laryngeal features—[SV], [cont], [Place], and [Lar]—while preserving the root [cons] node. As mentioned in §5.1.1, Chilean avoids deleting offending segments and opts for featural edits. Total deletion is circumvented by retaining the root [cons] feature in the structure, thus only partially deleting the segment.

(37) lað̬o → laCo [lá.o] ‘side’



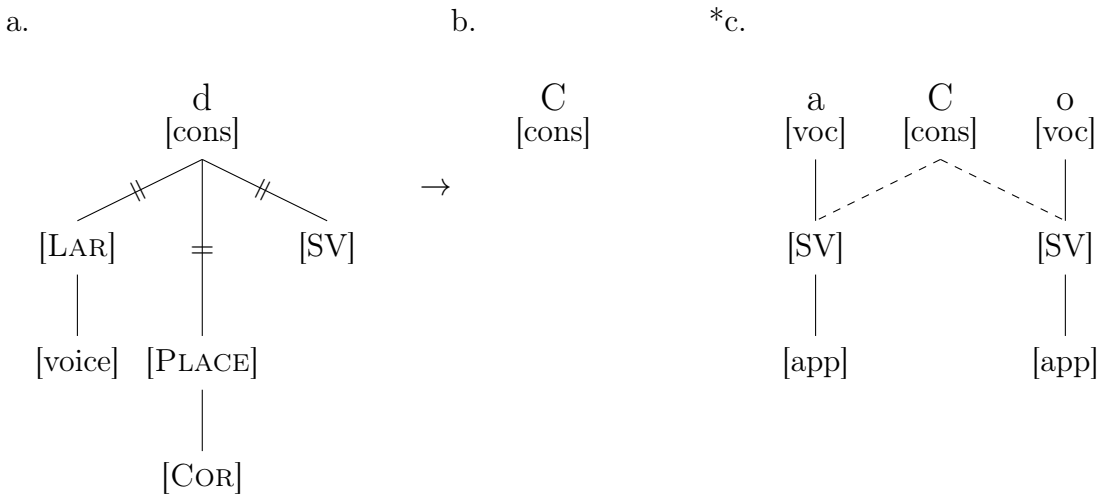
The partial deletion preserves a segment’s place in the representation and its occupancy of a prosodic position, preventing hiatus between surrounding vowels. We use [C] to for a near-fully deleted contoid, purposefully avoiding the null symbol [Ø] to denote that the deletion is partial. While it might seem intuitive to model this as the final stage in a stepwise lenition path (stop → fricative → approximant → near-total deletion), we propose that partial deletion is not crucially ordered with respect to spirantization or

[12] We recognize that the concurrent use of [cont] and [app] is not ideal, and that [app] does not actively contrast between [ð] and [ð̬] in Spanish, for example. Though an alternative featural analysis for lenition is possible, what we are most concerned with is partial deletion and the stability of [cons].

approximantization. Instead, it is one of multiple competing repair strategies available in the intervocalic environment. This account avoids stipulating a complex, multi-feature delinking rule and does not contradict Schein and Steriade's (1986) and Hayes's (1989) insight that shared features are resistant to delinking. Under this model, partial deletion, spirantization, and approximantization represent alternative lenition strategies.

The consequence of near-total deletion (38a.) is that the voiced stop's prosodic position is maintained by the residual [cons] root, preventing the two surrounding vowels from forming a true hiatus (38b.). If the stop were fully deleted, the vowels would come into direct contact, creating an environment that typically leads to resolution in Chilean. However, hiatus resolution is entirely unattested in these contexts, indicating that such vowels are not phonologically adjacent. An analysis where intervocalic stops are fully deleted would entail underapplication of glide formation. Without rule ordering, full deletion would incorrectly predict that /lado/ 'side' surfaces as *[láw] and not [lá.o]. Importantly, our autosegmental account requires no stipulation of crucial ordering because the stable [cons] root intercepts a hiatus environment, meaning that vowels on either side of [C] are not in a configuration where such repairs would be employed.

(38) /lado/ → laCo [lá.o], *[lá:.o], *[lá.o:] 'side'



This approach harmonizes two core pressures in the grammar: the drive toward articulatory ease (markedness) and the avoidance of total segmental deletion (faithfulness). By retaining the [cons] root while eliminating other features, the grammar satisfies both constraints. However, it introduces a representational paradox: [C] is too underspecified to be phonetically realized. One might expect, as in earlier assimilation patterns (§5.2), that neighbouring segments would supply the missing features through feature-filling. The reason this process is blocked for partially deleted stops is that [cons] is not a subset of the [voc] root. Therefore, features dominated by [voc], such as [SV] or [PLACE], cannot fill the empty slots of [C], as they would in (38c.).

In sum, once the voiced stop has undergone partial deletion, its structure becomes inert to further phonological repair. Its prosodic slot remains intact, preventing hiatus and preserving syllabic structure, but its phonetic realization is effectively null. Since feature-filling is not allowed to restore structure to the empty root, [cons] is outputted, and the surrounding vowels acoustically simulate a hiatus, but not phonologically represented as such. This accounts for both the phonetic disappearance of the stop and the absence

of any vowel-vowel interaction, without positing full deletion or ordering paradoxes. The result is a lenition strategy that is both faithful to the input segment count and optimal for articulatory ease.

5.2.2 Partial Deletion and Feature-Filling

Coda position is typologically marked, and speakers tend to prefer CV syllables, which are cross-linguistically the most preferred syllable type. The lenition of coda /s/ can be seen as an effect of this bias toward open syllables, similar to other coda reduction strategies implemented in Spanish, like the devoicing and deletion of final /d/ in Spain (Hualde & Eager, 2016). In coastal varieties of Latin American Spanish, /s/ has been reported to lenite to [h] or [Ø] (Hualde, 2005; Lipski, 1994), though more fine-grained phonetic variation has been documented as well (Torreira, 2007a). In Chilean Spanish, word-medial coda /s/ is most commonly debuccalized to [h], while word-final /s/ is frequently realized as [h] or deleted altogether (Cepeda, 1990a). Bolyanatz (2018) found that word-final /s/ in Chilean is increasingly deleted before a pause or onset consonant, and sometimes deleted or debuccalized[13] before vowel-initial words, producing an onset [h], as in /libros+a/ → [lívroha] 'books to.' Though a large body of research has addressed the variation of coda /s/ as a function of social factors, speech style, and formality, our study is not focused on sociolinguistic conditioning.

Word-final /s/ serves as a plural morpheme, so its deletion potentially neutralizes the contrast between singular and plural forms. In most cases, plurality remains recoverable through verbal morphology, but some scholars have observed compensatory mechanisms affecting the vowel preceding a deleted /s/ (Bolyanatz, 2018). While we did not conduct an in-depth acoustic study, our data do not show that morphological status (e.g. plural vs. monomorphemic /s/) reliably influences the likelihood of deletion. For a detailed overview of the phonological and morphological environments conditioning /s/ variation in Chilean Spanish, see Bolyanatz (2015).

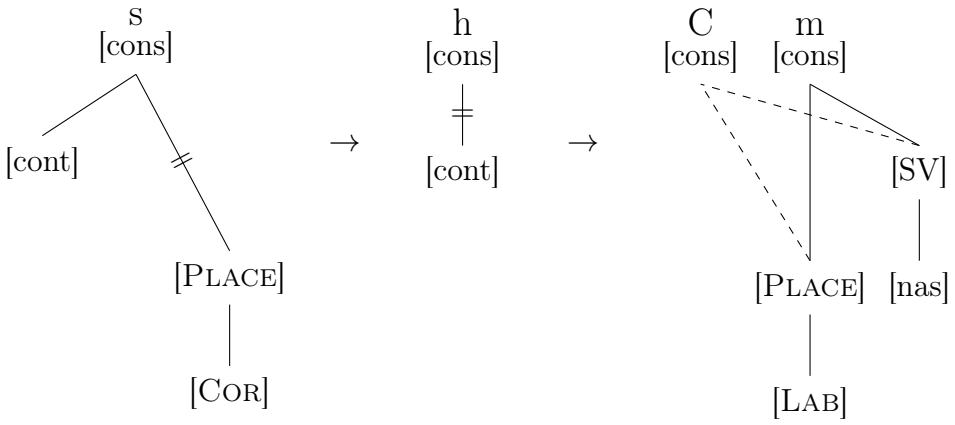
Our data show that word-medial coda /s/ is almost never deleted, and instead is typically realized as [h]. We argue that onset CL—what we analyze as pseudo-gemination—has been underreported. Researchers have often described /s/ "deletion" that precedes lengthening but have not noted the lengthening itself. For us, any time coda /s/ partially deletes, the onset of the following word within the same XP spreads its features to create a pseudo-geminate. This occurs in the rare word-medial coda cases as well as the more common word-final environments. The point we stress here is that pseudo-gemination necessarily occurs when the lenited target is too underspecified to surface on its own. We find no cases where a partially deleted /s/ precedes an onset contoid without pseudo-gemination, unless the target and the onset are separated by a prosodic boundary. This supports the view that the target is not fully deleted because feature-filling immediately intervenes to repair the phonotactics. By contrast, if all features were delinked from the mora, either the preceding vowel would lengthen (CL_{CVC}), or the stranded mora would be eliminated by Stray Erasure (Hayes, 1989), since Spanish does not have a contrastive vowel length distinction (De Chene & Anderson, 1979).

We represent /s/ lenition as a two-step process. First, delinking of place features (debuccalization), and second, delinking of [cont] (what we call *discontinuation*). The

[13] In the literature, this is commonly referred to as /s/-aspiration and not debuccalization necessarily, but we choose to emphasize that [h] is a result of place deletion, and avoid confusion with [s^h] (also "/s/-aspiration"), which occurs in some varieties.

first step results in [h]—a segment with a [cons] root and a [cont] dependent but no place features. The second step eliminates [cont], leaving a bare [cons] root. Spanish lacks glottal stops—whether implemented as bare [cons] roots or with laryngeal features such as [constricted glottis]—so this few-featured segment is not well-formed on its own. Regardless, the bare [cons] calls out for features from adjacent melodies, but vocoids are categorically blocked from participating in feature-filling here.

(39) /las+muxeres/ → lah muxeres → laC muxeres → [lammuxéreh] 'the women'

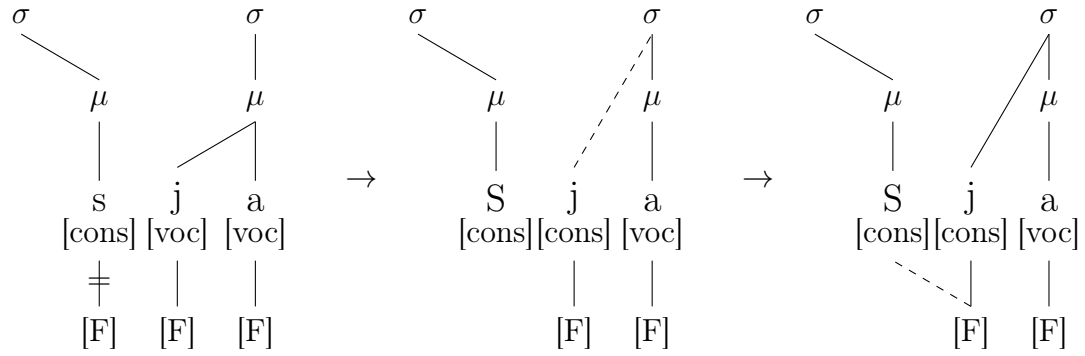


The result is a pseudo-geminate derived through place assimilation (sharing of [Place]) and manner assimilation (sharing of [SV]). However, as with voiced stops, the [cons] root node of /s/ restricts assimilation to feature-filling from contoids. Consequently, the segment is not fully deleted: the preceding and following vowels remain separated by a segmental boundary marked by an intervening [C], a near-totally deleted /s/. Forms like /los+ixos/ 'the sons' may surface with an onset glottal if /s/ at the right edge of the clitic is debuccalized: [lohíxos] (Bolyanatz, 2018), or they my omit even the [h] and leave [C] in intervocalic position: [lo.íxos]. This still differs from a true hiatus, which would be repaired in a parallel clitic+host environment in Chilean: /la+imaxen/ → [lajmáxen] 'the image.'

In sum, voiced stops lenite in intervocalic position, while /s/ lenites in domain-final position. Both processes can optionally result in a fricative output ([v, ð, ɣ]) through spreading [cont], and [h] through delinking [Place]. Both may also near-totally delete to yield [C], a segment with a [cons] root and no dependent features. The critical difference is that a [C] derived from /s/ may occur in environments where a following contoid can provide features to create a pseudo-geminate. If both immediate neighbours are vocoids, as with [C] derived from /b, d, g/, no material can be provided to [C] because vocoids are not supersets of [cons]. In such cases, [C] must be outputted in its featurally impoverished state, with no phonetic content but still occupying a position between its adjacent vowels, intercepting a hiatus.

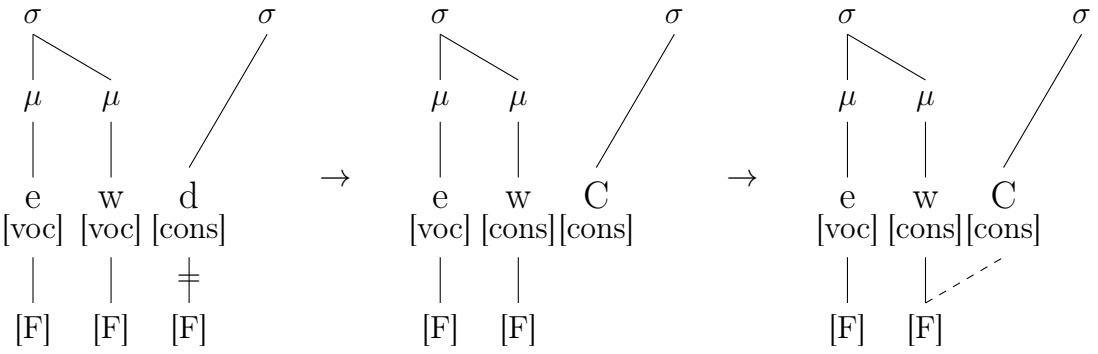
Rising diphthongs to the right of the target may still provide features if a glide is available to move from nucleus to onset position when the syllable is otherwise onsetless. Since glides can be [cons], this creates an onset and satisfies the preference for CV syllables. Even if Chilean does not actively enforce onsets, the presence of a bare [cons] root demanding features applies pressure to create an onset by reanalyzing a vocalic glide as consonantal in order to permit feature-filling.

(40) /las+jabes/ → laC jabes → [lajjáveh] ‘the keys’



Following this logic, if a falling diphthong were located to the left of a bare [cons] root, the mirror image of the previous scenario, we would not expect pseudo-gemination. For example, a string like /ajs/ would correspond to a superheavy syllable in a monomorphemic word, which is illicit in Chilean. Alternatively, if a domain ended in a heavy diphthong and /s/ belonged to the following domain (e.g. /aj+sa/), /s/ would be an onset and lenition would not apply. Thus, the only plausible scenario where a [C] could follow a glide would be in a form like /dewda/ ‘debt,’ where an intervocalic stop lenites.

(41) /dewda/ → dewCa → *[déwwa] ‘debt’



Although such a structure is theoretically possible, in practice, voiced stops never lenite beyond the approximant stage in these contexts; they do not partially delete after glides. Instead, near-deletion only occurs between head vowels: /dewda/ → [déwð̞a] *[déw.a]. Even in a hypothetical case where /d/ did delete and created a demand for feature-filling, forming a coda from a glide would increase markedness, whereas creating an onset would reduce it. Of course, Moraic Theory does not distinguish between nucleus and coda, meaning that a moraic glide in a dependent nucleus position would not be reanalyzed as a coda, and there would be no need to replace [voc] with [cons]. Additionally, converting a moraic glide from vocalic to consonantal would reduce sonority, counteracting the high-sonority preference for mora-bearing units. Given that codas are restricted in Spanish (Harris, 1983), assigning a glide to the coda would likely be impermissible regardless.

When segments are near-totally deleted, all features below their root node are delinked. For voiced stops, this happens in intervocalic position; for /s/, it occurs in domain-final position. The [cons] roots that remain occupy prosodic slots and act as a memory trace retained by the melody. Since feature-filling only applies when the target is a subset of the provider, and the identity of [cons] restricts providers to contoids, the process is constrained accordingly. If no adjacent contoids are available to replenish the root, the

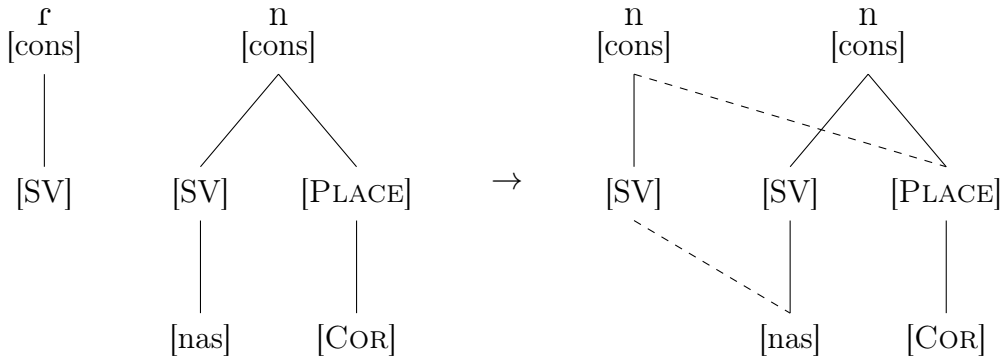
segment surfaces with no phonetic content due to a lack of phonological information, but still occupies a structural position that prevents hiatus.

5.2.3 Rhotics as Targets

For this section, we will continue to only consider the representation of the tap /ɾ/ because the tap-trill contrast is neutralized to the tap in coda position. Since pseudo-geminates are derived in coda-onset clusters with a rhotic in the coda, /ɾ/ is the target rhotic that we focus on, to the exclusion of /r̄/.

Recall that rhotics have been found to be underspecified for place features and also lack a specific feature [rhotic] that unifies them as a natural class. For our geometry, /ɾ/ is identified as a placeless sonorant contoid. That is, it lacks a [Place] node and has a bare [SV] node dominated by a [cons] root. In intervocalic position, this is enough specification for the segment to surface as a tap, but in a coda-onset cluster, the Syllable Contact Law (Murray & Vennemann, 1983) factors in. Rhotics in Spanish may occupy a slot in the sonority scale between vowels and laterals, or they might be grouped with laterals into a liquid category, in which a more fine-grained division places rhotics above laterals. Regardless, the featural asymmetry in a rhotic-lateral or rhotic-nasal cluster can be mitigated through feature-filling. As with /s/, place and manner features spread from the following onset to forma pseudo-geminate, except that in the case of /s/, the target does not have its own [SV] node. This allows sonorant contoids to spread [Place] and their entire [SV] structure, while non-sonorant contoids contribute features by spreading [Place] and [Lar]. For /ɾ/, no lenition takes place to delink features because having only a bare [SV] already makes /ɾ/ a subset of laterals and nasals. This predicts that /s/ can assimilate to any consonant, while /ɾ/ only assimilates to sonorants.

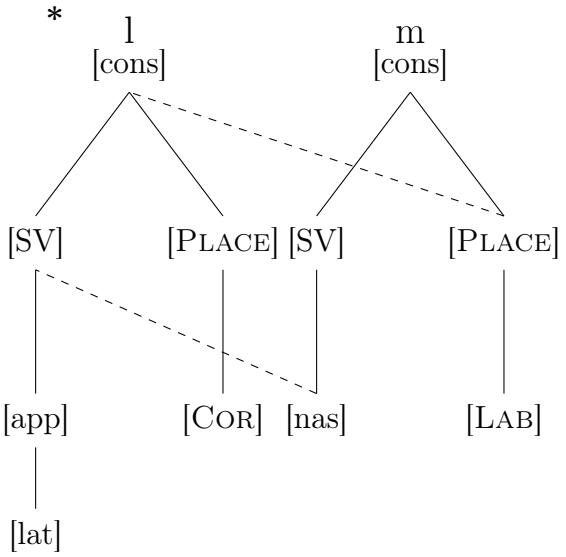
(42) /pjeɾna/ → [pjénna] 'leg'



When /ɾ/ is followed by /n/, the [Place] node that dominates [Cor] spreads to the open [cons] target of /ɾ/, and the [nas] feature fills the open [SV] target of /ɾ/, outputting a [nn] pseudo-geminate, e.g. /kaɾne/ → [kánne] 'meat.' When /ɾ/ is followed by /m/, the same process applies except [Lab] is below [Place], outputting a [mm] pseudo-geminate, e.g. /eɾmana/ → [emmána] 'sister.' Lastly, when /ɾ/ is followed by /l/, instead of [nas] spreading from one [SV] to the other, [app] spreads to the [SV] node of /ɾ/, carrying its [lat] daughter node to output a [ll] pseudo-geminate, e.g. /tomaɾ+lo/ → [tomállo] 'to grab it.'

Feature-filling in (43) is blocked because for sonorant features to spread, the structure c-commanded by the providing [SV] must be a superset of the target [SV]. Since laterals already have [SV] c-commanding [app] and [lat], the onset nasal cannot spread [nas] to

(43) /alma/ → *[ámma], [álma] 'soul'



the coda lateral. In contrast, since /ɾ/ has no structure under [SV], its [SV] node is a subset of all [SV] nodes. Therefore, any melody with an [SV] node that c-commands other features can provide /ɾ/ with sonorant features. There is also no variation between receiving [cont] from a preceding vowel, and receiving [SV] structure from the onset to repair the cluster as with the stop-nasal examples (22) because receiving [cont] would not alter the sonority of the rhotic, and the bare [SV] node of /ɾ/ is an open target for sonorant features to spread into.

Summary

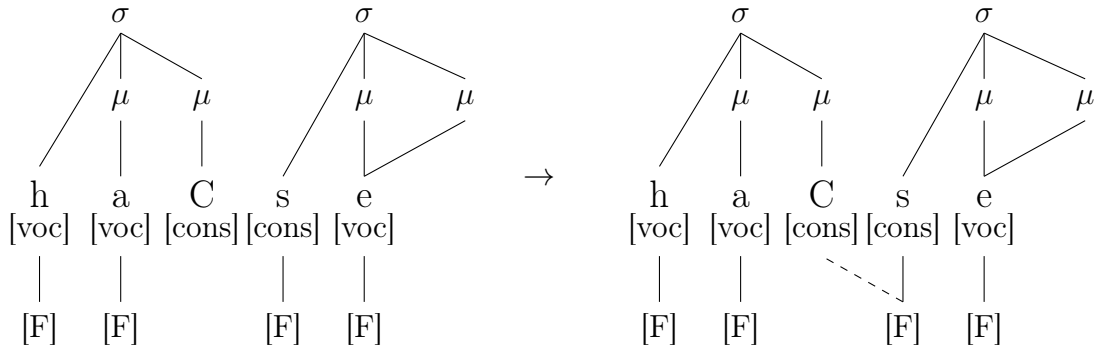
We have shown that when intervocalic voiced stops lenite, they can either spirantize with optional approximantization, i.e. /b, d, ɡ/ → /v, ð, ɣ/ → /v̞, ð̞, ɣ̞/, or they can partially delete, i.e. /b, d, ɡ/ → [C]. This partial deletion delinks all features below the root, leaving a sole [cons] feature in the string that stops surrounding vowels from being in hiatus and forming glides. Domain-final /s/ goes through a similar lenition trajectory in which it optionally place-deletes to [h], and optionally discontinues to [C], deleting all features but the root. Only [C] derived from /s/ can find itself adjacent to a contoid because of the phonological context specific to /s/ lenition. Because [cons] is not sufficient information for a segment to have a phonetic form, feature-filling can supply features from immediate neighbours, provided they are a superset of the target position. If this condition is not met, the string is outputted, and a silent segment is produced in compliance with the prosodic position retained by [cons]. Sonorant assimilation was shown to independently take place in Chilean as a phonotactic repair, e.g. /iɡnasjo/ → [iŋnásjo] 'Ignacio,' and place assimilation was shown to provide place features to placeless segments (rhotics), e.g. /desiɾ+me/ → [desímme] 'to tell me.' Thus, spreading place and/or sonorant features is an available method for providing deficient melodies with the necessary featural information to surface. Further, full deletion is avoided as it is more drastically unfaithful to the input. Should full deletion take place in a language with a corresponding length distinction, CL would create a long vowel, as it is preferred by the stray mora. Should deletion take place in Spanish, a language with no phonemic length, the stray mora would have no available material to dominate. The grammar

would resort to erasing the mora, and nothing would lengthen. Altogether, we have motivated a root node that carries a [vocalic] vs [consonantal] identification and shows stability effects when all other features are delinked, much like tone (Hyman, 2011). This revised representation outlines an analysis where root node assimilation is not the only possible CL process. Lengthening a segment not by spreading its root, but by spreading its features on lower tiers into empty structural positions of a preceding segment (i.e. place and manner assimilation) creates a pseudo-geminate.

5.2.4 Pseudo-Geminates in Other Languages

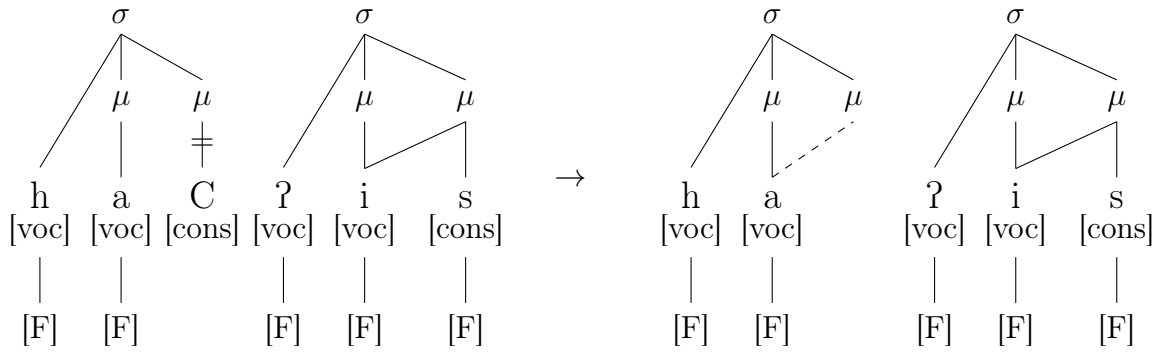
The distinction between geminates and pseudo-geminates proves helpful in the analysis of other languages. Returning to Tiberian Hebrew (Lowenstamm & Kaye, 1986), we propose that vowel lengthening is the universal outcome of CL, and that "gemination" in this language is better analyzed as pseudo-gemination through assimilation, as its application is constrained. The authors argue that gemination is the default realization of CL in Tiberian Hebrew, but when the following onset is a guttural, gemination is inhibited, and the stranded mora lengthens the preceding vowel. The definite article /ha/ appears to geminate the onset consonant of the base noun, as in /ha+seːfer/ → [hasseːfer] 'the book.' However, when the noun begins with a guttural, gemination fails to apply, and the article vowel lengthens instead: /ha+ʔiːs/ → [haːʔiːs] *[haʔʔiːs] 'the man'. If we suppose CL is caused by a floating mora introduced by a floating mora introduced by the article, we predict vowel lengthening uniformly: [haː], as vowels are cross-linguistically privileged by mora-bearing. Instead, we propose that the article includes a segmental placeholder /C/ that keeps the moraic position occupied with a bare [cons] root node in the coda of the syllable. When followed by a consonant that is a superset of /C/ (e.g. /s/), feature-filling derives a pseudo-geminate. When followed by a segment that is not a superset of /C/ (e.g. a guttural), feature-filling fails, and /C/ fully deletes, permitting its stranded mora to lengthen the preceding vowel.

(44) /haC+seːfer/ → [hasseːfer] 'the book'



In (44), the onset /s/ provides the missing features to the deficient [cons] root of /C/, creating a [ss] pseudo-geminate. In contrast, gutturals—perhaps specified with a [voc] root or other features that block feature-filling—are not a match for /C/, forcing deletion and classic vowel lengthening CL instead. Unlike Chilean, which tolerates [C] in the output, Tiberian Hebrew seems to constrain impoverished melodies in the surface form, so it opts for full deletion. Thus, Tiberian Hebrew supports the idea that feature-filling is the first repair strategy for mending deficient melodies, and since the language has a short-long vowel distinction, full deletion and CL_{CVC} can apply when assimilation fails.

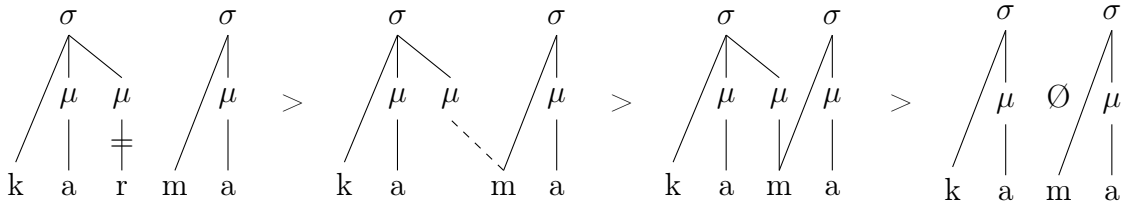
(45) /haX+ʔiːs/ → [haːʔiːs] ‘the man’



This approach predicts that CL creates pseudo-geminates by providing features to underspecified melodies, and creates long vowels as a consequence of deleting those melodies when they cannot be salvaged by feature-filling.

Historical evidence from degemination in Indo-Aryansuggests that two segments converging (a pseudo-geminate) is a representation different from that of a true geminate. Chatterji (1970) notes that true geminates in Middle Indo-Aryan were preserved in Pali but lost in Bengali, where the preceding vowel lengthened in compensation: *karma (Vedic) > kamma (Middle Indo-Aryan) > /kaːma/ (Bengali) ‘work.’ A true geminate is a single consonant associated to a mora, thus forming both the coda of σ_1 and the onset of σ_2 (Hayes, 1989). Degemination of a true geminate deletes its mora, not the segment, leaving the consonant as a singelton onset and not creating an environment for CL. This is why degemination, in itself, does not produce long vowels: the necessary mora is removed (De Chene & Anderson, 1979).

(46) karma > kamma > */kama/ ’work’

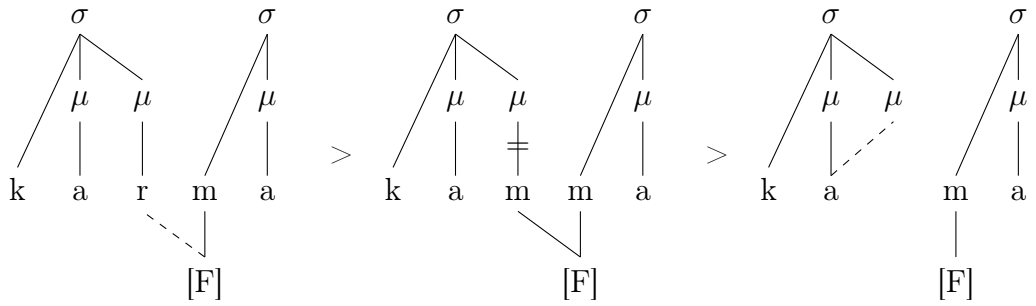


If Bengali /kaːma/ had arisen from degemination, /m/ would be a singleton onset but vowel lengthening would not have occurred. Instead, we must assume one /m/ was a separate coda segment, later deleted. Its mora was preserved and re-associated with the tautosyllabic vowel, resulting in a long /aː/ vowel. Bengali’s long vowel[14] thus demands a prior pseudo-geminate structure. The two /m/’s were near-totally assimilated in Middle Indo-Aryan, and at a later stage, the first /m/ in the coda of σ_1 underwent deletion, disconnecting its mora and directly facilitating the CL of the preceding /a/ vowel. This gives rise to the true Bengali form /kaːma/ ‘work’ (Mojumder, 1972).

Because Bengali /kaːma/ has a long vowel, the mora cannot have been lost during a degemination process. If a pseudo-geminate analysis is correct, coda constraints would apply to the first segment of the pseudo-geminate, and since nasal-nasal clusters are illicit in Bengali, coda /m/ must have delinked and facilitated vowel lengthening.

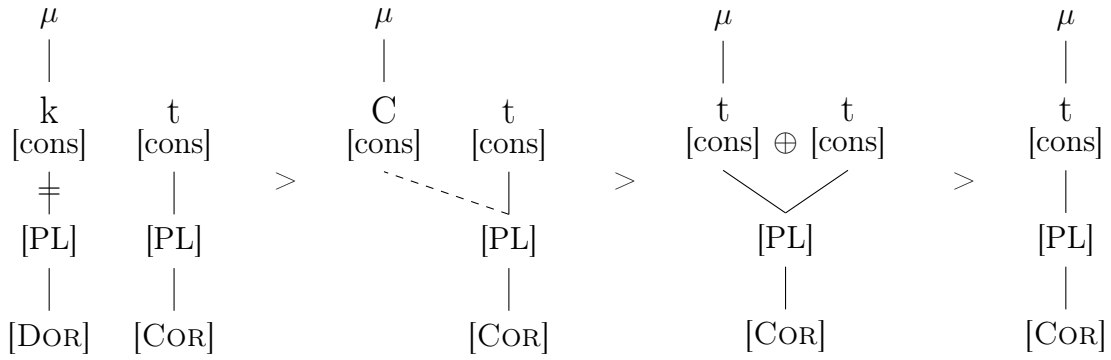
[14]Vowel length in Bengali later became a vowel quality distinction and phonemic length was neutralized (David, 2015).

(47) karma > kamma > /kaːma/ ‘work’



Finally, a parallel diachronic change is found in Italian. In contrast to Spanish, where codas may license their own place features, Italian codas must borrow place from onsets (Itō & Mester, 1994; Itō, 1986). In Latin forms like <septum> ‘seven’ and <doctōris> ‘doctor,’ coda consonants lost their place features and received them from the following onset, creating pseudo-geminates: /sette/, /dottore/. These clusters were then subject to the Shared Features Convention (Steriade, 1982), under which two partially converging feature matrices are fully merged when they agree on their remaining non-converging features. Once reinterpreted as a single matrix, the mora originally assigned to the coda dominates the new geminate. The new geminate status is then preserved lexically to maintain contrast with singletons. No new elements are introduced, since a two-phoneme contrast originally in a cluster is segmentally neutralized and transformed into a suprasegmental singleton-geminate contrast.

(48) dokto:ɾis > /dottoɾe/ ‘doctor’

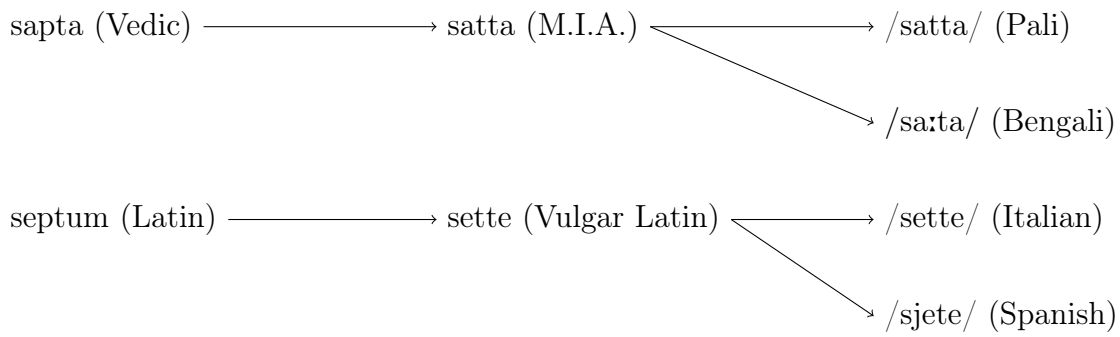


Chilean appears to be at an earlier stage of this same progression, since features spread from an onset to a preceding near-totally deleted /s/ or coda /ɾ/, deriving a pseudo-geminate. If this process became systematic, fusion may follow in the morpheme-internal cases (e.g. /tuɾno/ → [tunno] ‘turn’), lexicalizing the pseudo-geminate as a true geminate and mirroring Italian. However, because pseudo-gemination is highly variable and socially stigmatized in Chile, there is less likelihood of systematizing the process in younger generations. Though this is speculative, our impression is that young speakers are already pseudo-geminating less than older speakers.

To conclude, the apparent gemination seen in Tiberian Hebrew cannot be explained purely by lengthening directionality, as it depends on the segmental properties of the onset. If we instead adopt a model where root nodes are specified as [cons] or [voc] and can persist independently of deletion, then pseudo-gemination (via feature-filling) and deletion with concomitant vowel lengthening become predictable alternatives. The autosegmentally

stable contoid-vocoid root distinction provides a principled way to determine which repair applies. We hypothesize that vowel lengthening is the default reflex of full deletion, and that contexts for consonant lengthening are always restricted in some way, perhaps in all languages, warranting an analysis with partial deletion and pseudo-gemination. Addressing this question would benefit from research on CL in more languages.

(49)



Bengali further supports our view: since degemination deletes a mora, long vowels cannot result. But if pseudo-geminates undergo coda deletion, the resulting stranded mora can lengthen vowels, as observed. Finally, as exemplified by Italian, when pseudo-geminates persist, they become lexical geminates through fusion. Perhaps fusion took place in the trajectory from Middle Indo-Aryan /satta/ to Pali /satta/ 'seven,' while Bengali deleted the coda before fusion had a chance to birth a true geminate. All this cross-linguistic evidence points to a distinction between:

1) Geminate: a single contoid matrix underlyingly associated to a mora

2) Pseudo-geminate: partially converging contoid matrices, the first of which is moraic

Such a distinction unifies the behaviour of segmentally deficient roots, the application of CL, and the diachronic evolution of geminates across languages.

6 Conclusion

This thesis has explored the realization of compensatory lengthening in Chilean Spanish. Not having a phonemic length distinction entails that no Chilean consonant is underlyingly moraic, preventing the grammar from deriving geminates. We propose pseudo-geminates as alternative representations that respect the lack of a length contrast and are derived, not through total assimilation, but through partial assimilation. By adopting a feature geometric structure that contrasts vocoids and contoids by specifying either [vocalic] or [consonantal] in the root node, which remains stable after partial deletion, we can capture the derivation of pseudo-geminates.

When a coda /ɾ/ is found before a sonorant onset, it can assimilate in place by spreading of the [Place], and in manner by receiving sonorant features under [SV]. Given that rhotics are placeless and have a bare [SV] node, they are natural subsets of nasals and laterals, facilitating feature-filling from these classes. When domain-final /s/ lenites to [C]–a segment only specified with [cons] following partial deletion–and the following domain is contoid-initial, feature-filling is facilitated, and a pseudo-geminate is generated.

On the one hand, we can exclude partial assimilation from qualifying as a CL process, as true CL would require total deletion followed by total assimilation. Alternatively, we can revise our definition of a "geminate" to include partially converging matrices, conceiving the assimilation process that derives them as a form of CL. Either way, we should not continue claiming that geminates are directly derived through deletion and total assimilation without a fusion stage, because this process is reserved for vowel lengthening. Table (50) includes a summary of our proposed representations and their derivations.

(50)

Example	**Deletion type**	**Remaining representation**	**Feature-filling (CL) type**	**Outcome**
kasnus > /ka:nus/ 'gray' (Latin)	Total deletion	[Ø] and stranded μ	Spread [voc] (root node assimilation)	Long vowel
/los+niɲos/ → [lonníɲoh] 'the boys' (Chilean)	Partial deletion	Bare [cons] root ([C])	Spread features c-commanded by [cons]	Pseudo-geminate
doctōris > /dottoɾe/ 'doctor' (Italian)	Place deletion	Placeless stop	Spread [PLACE] and fuse the two matrices	Geminate

In Moraic Theory, languages with non-moraic codas are predicted not to have CL. If we accept that a pseudo-geminate is a possible distinct representation, regardless of the moraicity of the partially deleted coda, these languages could still lengthen consonants via partial assimilation, but not vowels. If the coda were fully deleted, there would be no stray mora for neighbouring melodies to spread into, so total assimilation would not be expected. Future research in languages of varying typologies regarding CL will be necessary to reveal if this observation is correct.

We did not accout for the representation of /r̄/, and its geminate-like effects on syllable weight. In onset position, the trill and the palatal consonants /tʃ, ɲ/ give weight to preceding syllables. Some scholars posit a geminate status for these (Harris, 1983), but since our analysis supposes that Spanish lacks phonemic length, an in-depth look at these cases should follow.

In a sense, the spreading of all features (root node assimilation) reflects assimilation on all dimensions, which in turn, is conceived as lengthening because an entire matrix is spread over two positions. The spreading of a specific feature (e.g. [nas]) reflects assimilation on a specific dimension (nasality), but this can also be conceived as "lengthening" on that dimension, as opposed to whole-segment lengthening. Hence, the nasal assimilation in /ignoɾansja/ → [iŋnoɾánsja] 'ignorance' could correspond to the lengthening of the [nas] feature, as it becomes spread over two positions. Partial deletion leads to a nearly empty melody that then assimilates to an adjacent melody, while total deletion leads to a fully empty position that then totally assimilates to an adjacent melody. This way, every instance of CL is, in fact, feature-filling, so perhaps CL is not a useful conceptualization to describe the spreading of features, be it all or some of them.

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